
Chapter 3 — DPNSS1/DASS2 features description and implementation

Overview

Intelligent private digital networks predominantly use the DPNSS1 protocol that allows PBXs from different manufacturers to interwork. In a private network that utilizes analog trunks, the signaling system that allows ISDN interaction is APNSS. Both APNSS and DPNSS1 support the same user features. In the UK, ISDN access to the Public Network is provided using the DASS2 protocol.

This section provides detailed information on features that are available for the current release of DPNSS1 on Option 11.

For some supplementary features, subsections have been created that offer a functional description, detail any specific requirements or limitations, explain interactions with other features, list software package requirements, and outline implementation procedures. These will be detailed at the end of this chapter.

DPNSS1/DASS2 feature descriptions

Add On Conference

This service allows the add on of more parties to a 3 party conference set up with the Three Party Service feature.

Bearer Service Selection

During call set up, the A party can inform the network that further services will be required later in this call, e.g. change from voice to data.

Call Back Messaging

When a call cannot be established, the A party can leave an indication on the B parties instrument.

Call Back When Free

The A party can initiate a call back order when either the B party is busy or trunks in the network are congested.

Call Back When Next Used

If no answer is received from the B party in a call, this feature can be initiated. When B is next used, the procedure will be the same as the Call Back When Free feature.

Call Distribution

When a call is made to the Destination Address for this service, the call is routed to one controlling PBX in the network. Stations in any PBX in the network can form an answer group and the call will then be passed to an extension allocated to this group or queued and monitored.

Call Diversion

Calls may be diverted to anywhere in the Network under these situations:

- Immediate
- On busy
- On no reply
- Follow Me

Call Park

The originating party on making a call to a busy extension may request to be parked on the called party. The called party may receive a tone and act as required.

Call Waiting

An extension can select whether a call waiting indication is given under the call offer situation.

Centralized Operator

Operators in a network can be in one or more nodes providing that an operator group is not spread between nodes.

Charge Reporting

Details of call charging can be sent through the network to the originator.

Controlled Diversion

When a call is made to a diverted extension, the A party can select the action to take:

- proceed with the diversion
- clear the call
- bypass immediate diversion if the called extension is free
- invoke another supplementary feature to a busy extension
- continue to ring called extension if diversion no reply is invoked

Data Call

A simple data call between two compatible terminals running in the same mode and at the same speed.

Do Not Disturb

Calls to an extension that have invoked do not disturb will receive busy unless the A party has requested override.

Executive Intrusion

The A party can intrude on a busy B party under control of intrusion and protection levels of all parties involved in call. Levels are 0 to 3 and the A party intrusion level must be higher than the protection levels.

Extension Status

The status of an extension can be requested without actually making a call. This would normally be used by the Operator.

Forced Release

Following intrusion to a busy extension a three party conference is set up, and the initiator of the intrusion may force release the unwanted party in the conference.

Hold

Either party in a call can place the other on hold to access other features. Both parties can not use the hold feature simultaneously.

Network Address Extension

This is the addition of up to 40 decimal digits to the networking routing digits which may be needed by an auxiliary machine or other switching device.

Night Service

By control of each Operator group in the network, calls may route to their own night service position or another operator. The specified night service point can be in any node.

Non Specified Information

Signaling information that is not specified in DPNSS1 for manufacture specific use. The header of the data string for this feature contains a system manufacturers code.

Priority Breakdown

On calling a busy extension or meeting network congestion, the A party can request clearing of an existing call in order to establish its own. Breakdown and protection levels (0-15) control this feature.

Register And Cancel Diversion

The initialization or cancellation of diversion features can be controlled from a remote PBX.

Register Do Not Disturb

The initialization and cancellation of do not disturb can be controlled from a remote PBX.

Remote Alarm Reporting

PABX alarm information can be sent around the network,, normally to a central location.

Series Call

A call can be marked as a series call, making it return to the assistance point on clearing by the B party. This will continue until either the series marking is canceled or the A party clears.

Simple Telephony Call

A voice call made between two extensions across the Network without operator assistance or any other feature invoked.

Swap

The change of a call type from either:

- voice to data
- data to voice
- data to data with change of operating characteristics e.g. mode or speed.

Text Message

A short message can be sent across the network for display on a telephone instrument. This is done purely by signaling without any call set up.

Three Party Takeover

If a call is in the three party situation but not in conference, the non controlling party make take control then continue any three party operation.

Time Synchronization

This allows the real time and date to be synchronized throughout the network.

Traffic Channel Maintenance

This gives the ability to busy a channel and perform tests on it. The channel may be looped back to itself or connected to another channel and tests may be manual or automatic.

Service Independent Strings

Service independent strings are strings of data sent over ISDN links indicating activity in progress. These strings contain data relating to miscellaneous information that may be required during the set up and use of other features e.g. class of service, queue information, passwords. The following group of user features use service independent strings:

Auto Answer

Indicates that answer has been generated by the called terminal equipment.

Busy Information

Indicates which features may be used after calling a busy extension:

- call offer
- intrusion
- call back
- call back messaging

Class Of Service

The A parties class of service controlling:

- Route restriction
- call barring
- Access to facilities

DASS2 Service Indicator Code

A DASS2 service indicator code may be passed within a DPNSS1 message. Normally for calls to or from DASS2.

Device Identity

Identifies a destination address if Originating or called line identities do not achieve this.

Direct Route Select

This indicates that the route specified in the call set up must be used and not any alternative:

- selection of higher grade circuits
- avoidance of routes that may be suspect
- avoidance of more expensive routes
- test calls

External Rerouting Disabled

Calls encountering congestion cannot be rerouted via another signaling system or to a different address using the DPNSS1 network.

Handsfree - Activated

This detail can be sent at any time in the call to either party that the other is in or has gone into the hands free state.

Handsfree - Deactivated

As point 13 but sent on deactivation of the feature.

Hunt Group Forwarded

If a call is made to a Hunt group that is split over the network, this information tells the receiving PBX that the call was originally for a Hunt group:

- to avoid nesting
- to take specific action for diversion or call waiting
- to give indication to called party

Intercom Call

If a intercom call is made between PBX systems, special action may be needed:

- calling signal
- calling display
- call logging
- diversion features

Internal Rerouting Disabled

When encountering congestion, the call cannot be rerouted via the DPNSS1 network.

NAE - Identity Incomplete/Complete

If the Network Address Extension is being used the identity complete message is normally sufficient, but if the NAE is greater than 45 octets then it is split into 2 messages. The first will contain the incomplete message and the second the complete.

Password

This string is used to check passwords when needed within the network.

Queue Information

Used when calling a busy extension to indicate:

- the number of calls currently queued
- the position of this call in the queue
- the number of positions capable of answering the queued calls

Queuing Priority

On calls to busy extensions when it is needed to take special action, priority levels (0-255) can be used to control this.

Satellite Barred

This indicates that a call may not be routed via a satellite:

- if the call has already made one satellite hop
- if the call should not use satellites at all

Supplementary Features Inhibited

This indicates that the use of any supplementary features should be inhibited.

Text Display

To send additional text information relating to features:

- more than basic CLI e.g. name
- reason for call failure

Trunk Identity

Information on the incoming trunk call:

- PBX number
- trunk route number
- trunk route member number

DPNSS1 supplementary services

This section provides detailed information on the supplementary services, or features, that are available for the current release of DPNSS1 on Meridian 1.

For each supplementary service, subsections have been created that offer a functional description, detail any specific requirements or limitations, explain interactions with other features, list software package requirements, and outline implementation procedures.

DPNSS1 Attendant Call Offer

The DPNSS1 Attendant Call Offer feature allows an attendant-extended calls routed over DPNSS1 to be camped-on to a remote busy extension. The DPNSS1 signaling used to implement the feature complies with section 14 of BTNR 188. This Call Offer functionality is provided over a DPNSS1 network or over a DPNSS1 to ISDN gateway.

After being offered the camp-on, the destination party may accept or reject it. During the camp-on offer, the destination party receives camp-on tone, heard over the conversation. The destination party accepts the call offer by clearing the established call (the offered call may not be accepted by simply placing the established call on hold). The destination party rejects the call offer by not answering it.

If the busy party goes on hook, allowing the offered call to ring the set, the recall timer for the call is reset to the value programmed for ringing calls. If the call remains unanswered when this timer expires, the offered call is recalled to the attendant queue. If the call is accepted, the originating party receives ringback until the destination party goes off hook to answer the call.

If the call is rejected, the camp-on is recalled to the attendant after the camp-on timer times out (timing for camp-on recall begins as soon as the attendant presses the Release key to extend the camp-on to the destination party.) The destination party may still answer the camp-on as long as the call is still on the attendant console (that is, while the attendant is talking to the source.) The attendant may clear the camp-on by releasing the destination.

Operating parameters

- Timed Reminder Recall feature for DPNSS1 must be equipped.
- Call Offer over DPNSS1 applies only to attendants with an established call on the source side. An attendant can then camp-on a call only if the destination station is on an established call.
- An inquiry call cannot camp-on to a busy station without attendant intervention — the camp-on attempt is rejected (an inquiry call exists when two stations are established in a simple connection, and one station offers a call transfer to another station. The set making the call transfer places the other established station on hold before making the call transfer.) If the busy station has Call Waiting Allowed Class of Service, the call offer will be presented to the busy station as a call waiting call.
- Only one call at a time may be camped-on to a busy destination station.
- Camping-on is possible to a set in a ringback or dialing state.
- Calls cannot be camped-on to a busy destination station with Call Waiting Allowed Class of Service, or that is second degree busy.
- During Night Service, any camped-on call is canceled and recalled to the night DN or re-routed to an attendant at another node if NAS is configured and active.
- If mixed ISDN/DPNSS1 route lists are programmed at a gateway node, an incoming call over an ISDN route that uses an outgoing DPNSS1 route for a first call without call offer, will use the same DPNSS1 route for a call offer.

Feature interactions

- The destination receives camp-on tone if the destination set has Warning Tone Allowed Class of Service, and Camp-on Tone Allowed has been configured for the customer in overlay 15 (the Customer Data Block.)
- Semi-Automatic Camp-on does not function over DPNSS1.
- DPNSS1 Executive Intrusion Conversion is not supported on the Meridian 1.

- The Flexible Orbit Prevention Timer *should be set* to a value of “0” in overlay 15. A non-zero value may cause problems for DPNSS1 calls encountering call forwarding, since two consecutive calls would be initiated from the originating station to the terminating station — refer to the feature interaction description for DPNSS1 Diversion which follows.
- In the case of DPNSS1 Diversion, if a call encounters a station with Call Forward active, then a new call is initiated from the originating node to the call forward extension. The following situations are considered involving attendant-extended calls:
 - An attendant extends a DPNSS1 call originating from a Meridian 1, and the call does not contain a request for call offer. If the destination has Divert Busy or Divert Immediate active, then a new call is initiated as a simple call. If the call contains a call offer request, a new call is initiated using the new address and containing a Call Offer String.
 - An attendant extends a DPNSS1 call terminating at a Meridian 1, and the call does not contain a request for call offer. If the destination has Call Forward All Calls active, then the call is routed to the call forward extension. This also applies if the destination is busy, and active with Call Forward Busy
 - If the call contains a request for call offer and encounters a destination with Call Forward All Calls active, then the call is routed to the call forward extension. If the routing involves a DPNSS1 trunk, then the call will contain a Call Offer Supplementary Information String. If the call encounters a destination with Call Forward Busy active, the call is camped-on to the destination, if camp-on is allowed. If camp-on is *not* allowed, the call is routed to the call forward busy extension. If the routing involves a DPNSS1 trunk, then the call will contain a Call Offer Supplementary Information String.

- If an attendant-extended DPNSS1 call encounters Diversion Busy or Diversion Immediate at a Meridian 1 gateway node, then a new call is initiated from the gateway node to the diverted destination. If a request for call offer was contained in the original DPNSS1 call, it will also be contained in the new call. If a request for call offer was *not* contained in the original DPNSS1 call, and if the new destination is busy and camp-on is allowed on it, then the call offer request will be included in the new call.
- The displayed information normally provided by the Attendant First-Second Degree Busy Indication that indicates that a station on a far node is in first or second degree busy status, is *not* provided in an ISDN/DPNSS1 gateway scenario.
- The Slow Answer Recall Modification feature, upon recall to the attendant from the original camp-on destination, requires the attendant to dial the extension again to be able to extend and camp-on the call again.
- Integrated Services Access (ISA) Call Types are not supported over DPNSS1.
- DPNSS1 operation and features are not supported with Meridian Link.
- Where the Secrecy feature is concerned, DPNSS1 calls, while at the source of the attendant, are considered as internal calls, unless the destination is a trunk.

Feature packaging

- DPNSS1 Network Services (DNWK) package 231

Dependencies:

- Digital Private Network Signaling System No.1 (DPN) package 123;
- Digital Access Signaling System No.2 (DAS) package 124;
- Integrated Digital Access (IDA) package 122, dependent on Digital Trunk Interface (PBXI) package 75, 2 Mbit Digital Trunk Interface (DTI2) package 129;
- Network Attendant Service (NAS) package 159;
- 2 Mbit Primary Rate Interface (PRI2) package 154, dependent on Integrated Services Digital Network (ISDN) package 145, Digital Trunk Interface (PBXI) package 75

Feature implementation

- None.

DPNSS1 Attendant Timed Reminder Recall and Attendant Three Party Service

This feature implements the portion of the DPNSS1 Three Party Service which relates to attendant console operation. It also extends the operation of the existing DPNSS1 Timed Reminder Recall feature to calls extended from Meridian 1 operator consoles over DPNSS1 links.

Timed Reminder Recall allows a call that is extended by an attendant over a DPNSS1 trunk, to be recalled to the attendant if not answered within a customer-defined period of time. The source and destination parties remain active in the call.

Three Party Service allows the source and destination set displays to be updated, after the extended call has been answered at the destination set.

The recall timing is implemented at the Meridian 1 attendant node in the form of the slow answer recall timer and the camp-on timer. When the attendant extends a call to a destination extension in the ringing or call waiting state, by pressing the RLS key, the slow answer timer is started. If the extended call is camped on to a busy destination set, the camp-on timer is started.

If the idle set answers the call extension or the busy set answers the call waiting, the slow answer timer is stopped and the attendant node becomes a standard transit node. Messaging is immediately sent to update, by the Three Party Service feature, the displays on the source and destination sets.

If the busy set becomes free to answer the camp-on, the camp-on timer is stopped, the set receives ringing and the slow answer timer is started. If the call is answered, the slow answer timer is stopped and the attendant node becomes a standard transit node. The displays on the source and destination sets are updated.

If the slow answer recall timer expires, the source is recalled to the attendant, with the destination party still ringing or busy (in the case of call waiting). The attendant may extend the call once more by pressing the Release key. This causes the slow answer timer to start again. If the camp-on timer expires, the source is recalled to the attendant. The attendant may extend the camp-on once more by pressing the Release key. This causes the camp-on timer to start again.

During Night service, a DPNSS Timed Reminder recall will recall to the Night DN only if the Source call is extended; otherwise it will be placed on the attendant queue. If NAS is available, the call will be routed to the first available attendant found over NAS routing.

The attendant is also able to operate the Hold key before extending the Source call (by using the RIs key. This allows the attendant to break back into the Source call before the destination answers or before waiting for the DPNSS Recall Timer to expire. If the attendant does not operate the Hold key, they will not be able to retrieve the extended call, but rather must wait until the recall timer expires (assuming that the destination does not answer).

It may be that the attendant node is a gateway node. If a call on the source comes in over an ISDN trunk and is extended to the destination over a DPNSS1 trunk, then recall timing is done by the DPNSS1 Timed Reminder Recall feature. After the attendant extends the call and the destination answers, the recall timer is stopped. The controlling (attendant) node sends signaling to the destination node, to update the display of the destination set. The display on the source set is updated only if Network Call Redirection feature is equipped. If the recall timer expires before the destination answers the call, the source is recalled to the attendant with no messaging being sent over the ISDN link.

If the source comes in over a DPNSS1 link and is extended to the destination over an ISDN link, then the recall timing is done by the Network Attendant Service (NAS) feature. After the attendant extends the call and the destination answers, the recall timer is stopped. The controlling (attendant) node sends signaling to the source node, to update the display of the source set. The display on the destination set is not updated by NAS; it is updated only if Network Call Redirection feature is equipped, and the call has been extended after the destination party has answered. If the recall timer expires before the destination answers the call, the source is recalled to the attendant with no messaging being sent over the DPNSS1 link. If the attendant transfers the call after it has been answered by the destination, the display of the source set is updated by Three Party Service signaling. The display of the destination set is updated if Network Call Redirection is equipped.

Operating parameters

- The slow answer timer is used for calls extended to a set in the call waiting state (since the DPNSS1 Call Waiting supplementary service has not yet been implemented).

Feature interactions

- If a call is extended over a DPNSS1 link to an ACD set, the controlling node will time for a slow answer recall while the call is in the ACD queue at the destination node.
- Recall timing is not performed for attendant-to-attendant calls.
- For calls extended over a DPNSS1 link, the slow answer recall timer is used instead of the call waiting recall timer, since the Meridian 1 does not distinguish between a call extended to a set that is idle or in call waiting state.
- To prevent recall timing from being done at the originating node if the timing is done at the controlling node, the EEM messages TRFD and RECON are not sent from the controlling node to other parties involved in the call (this inhibits the DPNSS1 Call Redirection feature).
- The DPNSS1 Loop Avoidance string (LA) may be added to the Initial Service Request Message (ISRM) of an inquiry call.
- The Attendant Three Party Service at a controlling Meridian 1 node initiates the signaling sequence that causes the DPNSS1 Route Optimization feature, equipped on the originating node, to optimize the route between the originating and destination parties.
- A Recall ICI key that has been defined in the customer data block lights up when DPNSS1 timed reminder recall occurs.
- If the Night Service Improvements package is equipped, recalls to the attendant during night service are routed to the night DN. This applies to calls extended over ISDN and DPNSS1 trunks.
- If, while extending a call, the attendant presses the HOLD key before pressing the RLS key, the call is placed on permanent hold on the loop key. The call is subject to the Timed Recall feature.

- Pressing the Recall key on a set has no effect, if the set is connected to the attendant over a DPNSS1 trunk and is being timed for slow answer recall or camp-on recall.
- If the Recall to the Same Attendant feature is configured for an attendant, slow answer recalls and camp-on recalls occur to the same attendant.
- If the Secrecy feature is activated by the attendant, the source side of a call being extended by the attendant is excluded if the destination is a trunk. As applied to a DPNSS1 trunk, the Calling Line Category received from the trunk must be DEC, DASS2, PSTN, or MF5.
- If the Slow Answer Modification feature is activated by the attendant, the destination party is dropped when the recall occurs to the attendant.
- The Semi-Automatic Camp-on feature does not apply to calls extended over a DPNSS1 trunk.
- If a call is routed during night service by the Network Attendant Service feature to a set over a DPNSS1 link, the Night Forward No Answer feature will not apply as the information indicating that the call has been answered cannot be sent.
- DPNSS1 does not support either the Group Hunt or Group Hunt Queuing features.
- DPNSS1 operation will not support the following:
 - ISDN Basic Rate Interface (BRI) setsor
 - ISDN BRI Numeris Terminals.
- DNIS information (number and name) for redirected calls will be retained and available to the called party if the redirection terminates on the original node where the DNIS information is available.

Feature packaging

— DPNSS1 Network Services (DNWK) package 231

Dependencies:

- Digital Private Network Signaling System No. 1 (DPN) package 123;
- Integrated Digital Access (IDA) package 122, dependent on Digital Trunk Interface (PBXI) package 75, 2 Mbit Digital Trunk Interface (DTI2) package 129;
- International Supplementary Features (SUPP) package 131
- Basic Alternate Route Selection (BARS) package 57, dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Co-ordinated Dialing Plan (CDP) package 59, dependent on Dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Pretranslation (PXLT) package 92
- Flexible Numbering Plan (FNP) package 160
- Network Attendant Service (NAS) package 159, for a mixed ISDN/DPNSS1 environment

Feature implementation

- **LD15-** In the Customer Data Block, define the parameters for recall timers and the attendant DN. Define a Night DN for the customer.
 - In response to the ATDN prompt, enter the attendant DN. Recalls occur to this DN, upon expiration of the recall timer.
 - In response to the RTIM prompt, enter a value for the slow answer recall timer (0-(30)-378), camp-on recall timer (0-(30)-510), and call waiting recall timer (note that for calls extended over a DPNSS1 link, the slow answer recall timer is used instead of the call waiting recall timer, since the Meridian 1 does not distinguish between a call extended to a set that is idle or in call waiting state. The slow answer value is used in both cases).

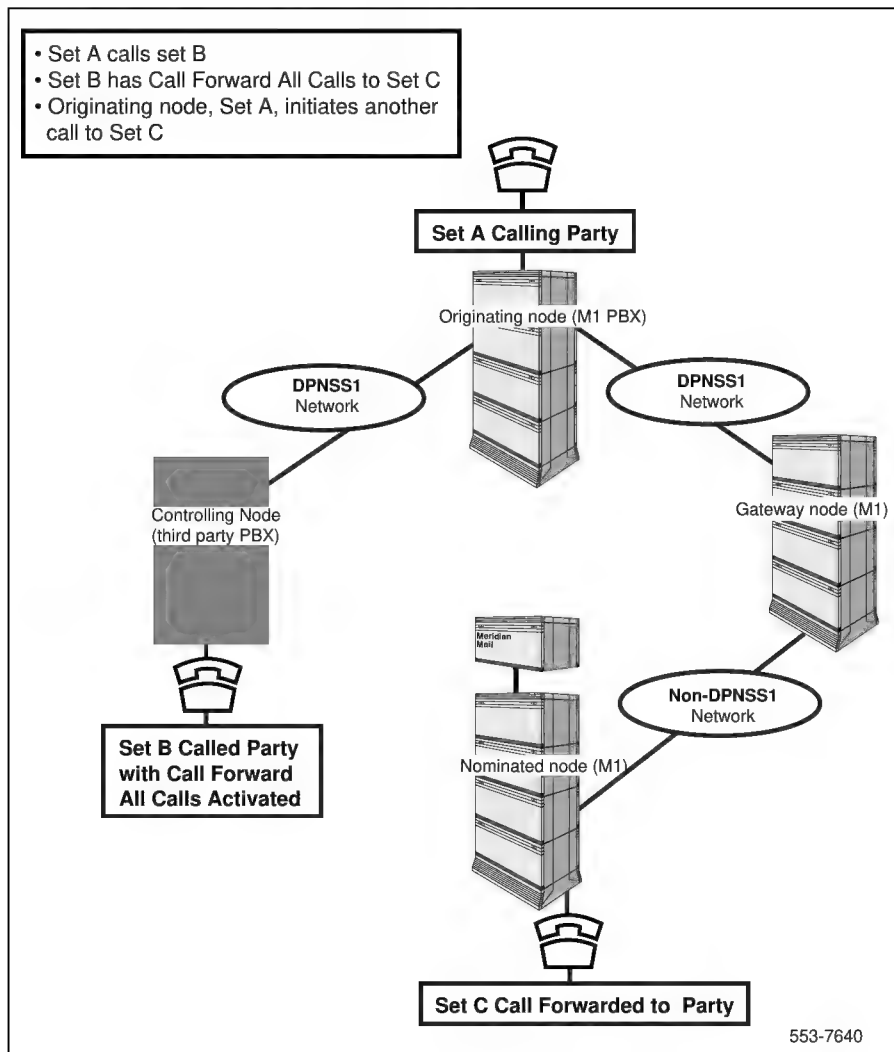
DPNSS1 Diversion

DPNSS1 Diversion is a British Telecom Network Requirement (BTNR) supplementary service that provides full DPNSS1 Diversion signaling on DPNSS1 links, when one of the redirection features listed below is invoked:

- Call Forward All Calls;
- Call Forward No Answer;
- Call Forward by Call Type;
- Call Forward Busy;
- Hunting/Group Hunting;
- Intercept Computer Call Forward All Calls;
- Call Forward Internal Calls;
- Meridian Customer Defined Network Call Redirection; and
- Call Party Name Display.

When a set activates a redirection feature such as Call Forward All Calls, DPNSS1 signaling informs the call originating node that the call is being forwarded to another set. If the forwarded party is located on another node, the call originating node is requested to initiate a new call. When the forwarded to party is reached by the call originator via DPNSS1, the forwarded to party is notified that the incoming call has been forwarded.

As illustrated in Figure 58, Call Diversion functions on Meridian 1 nodes that are linked to third party Private Branch Exchanges (PBXs) within a DPNSS1 network. Meridian 1 gateway nodes provide links to other Meridian 1 nodes by Meridian Customer Defined Network (MCDN) and to Meridian 1 and third party PBX through DPNSS1. In this figure, the Nominated party or forwarded to party, is reached through full DPNSS1 or combined DPNSS1 or non-DPNSS1 (such as MCDN) routes.

Figure 58- DPNSS1 Diversion Environment.

The following capabilities are provided as part of the DPNSS1 Diversion: Diversion Validation, Diversion Cancellation, Diversion Follow-Me, Diversion By-Pass, Diversion Immediate, Diversion On Busy and Diversion On No Reply. These capabilities are described as follows.

Diversion Validation

DPNSS1 Diversion operates on Meridian 1 nodes that are linked to third party PBXs, within a full DPNSS1 environment. Meridian 1 gateway nodes are linked with other Meridian 1 nodes through a Meridian 1 Customer Defined Network (MCDN) and the other Meridian 1, or to other third party PBXs via DPNSS1 networks.

Diversion Cancellation

Diversion Cancellation allows the forwarded to party to remotely deactivate call diversion initiated by the forwarding party. Meridian 1 DNs cannot originate Diversion Cancellation requests however, Meridian 1 PBXs can process Diversion Cancellation requests but cannot initiate requests.

The sequence for Diversion Cancellation is the following. Set A has activated Call Forward All Calls (CFAC) to Set B. Set B, the forwarded to party, requests either Diversion Immediate or Diversion-All Cancellation to Set A. Upon receipt to the cancellation request, Set A's node determines that Set B is currently CFAC activate to Set A's DN. If the DN is confirmed, then the CFAC feature is deactivated and Set B is notified that the cancellation request is successful.

If Diversion Cancellation request encounters any gateway, the gateway responds with a "Service Unavailable" notification.

Diversion Follow-Me

Diversion Follow-Me allows the forwarding party to remotely request and change a new forwarded to party. As an example, Set A has activated Call Forward All Calls to Set B, in a full DPNSS1 environment. Set A then decides to change Set B, the forwarded to party, to Set C. When Diversion Follow-Me is activated, Set A's node uses Diversion Validation to confirm that the new forwarded DN is valid.

If a Diversion Follow-Me request encounters any gateway, the gateway responds with a “Service Unavailable” notification. A Follow-Me request is always rejected when routed through a gateway.

Meridian 1 PBXs can process Diversion Follow-Me requests but cannot initiate any requests.

Diversion By-Pass

Diversion By-Pass allows the calling party to ignore the diversion assigned by the party that activated call redirection. Meridian 1 DN's cannot originate Diversion By-Pass requests, but can process requests.

Diversion Immediate

With Diversion Immediate, the calling party, Set A, dials Set B that has activated Call Forward All Calls (CFAC) to Set C. Upon receipt of the call, Set B's node instructs Set A's node to Divert-Immediate to Set C.

When instructed to divert, Set A's node clears the old call and initiates a new call to Set C. Set A's display is updated with diversion information, when the call is established with Set C.

Diversion On Busy

The sequence for Diversion On Busy via Separate Channel is similar to Diversion-Immediate. The differences occur with message contents and the reason for diversion, if Call Party Name Display is activated.

If Diversion on Busy is triggered by the Hunt feature, it is also triggered by Call Forward By Call Type applied to Hunt. A node determines an internal call on the Calling Line Category (CLC) received with the incoming call.

For Call Forward Busy, the following two cases exist. If the forwarded set has enabled Message Waiting Forward Busy, the call may be directed to the FDN or Message Waiting key. In this case, the Diversion On Busy signaling applies. However, if the forwarded set is not equipped with Message Waiting Forward Busy, the call is always routed to the Attendant.

Diversion On No Reply

Call Diversion on No Reply ensures that a Call Forward No Answer (CFNA) call is not disconnected until the new diversion call is successful.

The sequence for Diversion On No Reply functionality is the following. Set A, the calling party, dials Set B. Set B rings and has Call Forward No Answer activated to Set C. When requested by Set B's node to Divert the call on No Reply, Set A's node initiates a new call to Set C. When Set C answers the diverted call, the original call between Set A and Set C is disconnected.

Operating parameters

Interworking with MCDN Trunk Route Optimization (TRO) is supported.

On Meridian 1 nodes, M3000 Meridian 1 proprietary sets are not supported when using DPNSS1 signaling.

The Nominated party's, the forwarded to set, display is updated in full DPNSS1 or mixed DPNSS1/MCDN routes. The Nominated party can be Meridian Mail.

Access forwarding to Meridian Mail via a full DPNSS1 environment operates from X11 Release 20 and later Meridian 1 nodes. Access forwarding to Meridian Mail via full MCDN/DPNSS1 gateway operates, if all the gateways between the calling party and the Meridian Mail host node are X11 Release 22 Meridian 1 nodes.

The Message Waiting Indication (MWI) key of a Meridian 1 DN is never lit if reached from a Meridian 1 Meridian Mail node via DPNSS1. No Message Waiting Indication signaling is implemented on DPNSS1 between Meridian 1 nodes. No MCDN/DPNSS1 functionalities exist for Meridian Mail Message Waiting Indication capabilities.

In a mixed Uniform and Coordinated Dialing Plan environment, it is recommended to always use the Uniform Dialing Plan (UDP) format for forwarded data.

Feature interactions

Attendant Forward No Answer

If an incoming call is handled for Network Attendant Services routing towards DPNSS1, no diversion signaling is sent back to the calling party.

Call Forward All Types

The Call Forward All Types features on unanswered calls are activated in the following order: Call Forward All Calls, Message Waiting, Call Forward No Answer, Slow Answer Recall. For busy sets the order is: Call Forward All Calls, Hunting, Calling Waiting/Camp On, Message Waiting Busy Forward, Call Forward Busy.

Group Hunting

Only simple DPNSS1 calls support Group Hunting. All DPNSS1 supplementary services do not support Group Hunting.

Meridian Mail

Following DPNSS1 Diversion, the new call can reach Meridian Mail via full MCDN, full DPNSS1 and mixed MCDN/DPNSS1 links. Following MCDN Call Forward towards DPNSS1, the new call can reach Meridian Mail via full MCDN, full DPNSS1 and mixed MCDN/DPNSS1 links.

Night Service

If a diverted call encounters an attendant in night service, the call receives Night Service Diversion if available.

Phantom Directory Numbers

Phantom Terminal Numbers

If an incoming call to a Phantom TN contains a DIVERSION BY-PASS REQUEST, Call Forward All Calls applies.

Route Optimization

If a Route Optimization call setup encounters any redirection features, these features are ignored. The condition for a diverted call to have Route Optimization after connection is the same as a simple DPNSS1 call. Route Optimization starts if the diverted call is routed through a non-first choice route or when a call transfer involving the diverted call is completed.

User Selectable Call Redirection

The User Selectable Call Redirection feature triggers Diversion Validation. If the numbering plan is DPNSS1 then diversion occurs. Numbering plan routes are checked to determine if redirection DN's are through DPNSS1 on a first choice route basis. If the number plan is not a DN through DPNSS1, then User Selectable Call Redirection works as usual.

Feature packaging

DPNSS1 Diversion requires DPNSS1 Network Services (DNWK) package 231.

Basic DPNSS1 networking requires:

- Integrated Digital Access (IDA) package 122;
- Digital Private Network Signaling System 1 (DPNSS) package 123;
- 2.0 Mbps Primary Rate Interface (PRI2) package 154.

DPNSS1/MCDN Gateway requires:

- International Supplementary Features (SUPP) package 131;
- Integrated Services Digital Network (ISDN) package 145;
- ISDN Advanced Network Services (NTWK_SRVC) package 148;
- Network Attendant Services (NAS) package 159;
- ISDN Call Connection Limitations (ICCL) package 161 for gateway with loop avoidance.

Feature implementation

For DPNSS1 Diversion to occur redirection features must be configured.

Feature operation

Activating Call Forward All Calls over DPNSS1

Set A invokes Call Forward All Calls (CFAC) to Set B, the forwarded to party over a DPNSS1 network. In a non-DPNSS1 network environment, then the Call Forward All Calls is normal operation.

- 1 If the dialing plan reaches Set B via DPNSS1, a **VALIDATION REQUEST** is sent to Set B. The CFAC key remains flashing.
- 2 Upon receipt of the request, Set B's node responds to the validity of Set B's DN. If the DN is valid, the CFAC feature is activated. The CFAC key is lit. However, if the DN is not valid, Set A hears an overflow tone, and the CFAC key remains flashing.
- 3 If the forwarded DN is local or reached through a non-DPNSS1 network, the usual CFAC activation process applies. No DPNSS1 messaging occurs.

DPNSS1 Executive Intrusion

Digital Private Network Signaling System 1 (DPNSS1) Executive Intrusion enables an originating party to break-in to an established call under certain circumstances. The Meridian 1 only allows this feature to be activated from Attendant Consoles; however, it will accept an Executive Intrusion activation request from a regular set on a third-party PBX.

For the purposes of this feature description the term “requested” party will be used to describe the person on the established call who the originating party desires to talk with, and the “unrequested” party will mean the person on other end of the call. On an Option 11, Executive Intrusion is only activated if the attendant places the call to the requested party over a DPNSS1 link. If the attendant and the requested party are located on the same node, the current Attendant Break-in feature is activated. Executive Intrusion is activated by using the existing Break-In key on an Attendant Console.

When an attendant presses the Break-In (BKI) key to invoke Executive Intrusion, the node where the requested party resides checks the Intrusion Capability Level (ICL) of the Attendant Console against the Intrusion Protection Levels (IPLs) of the parties involved in the call. If the ICL is higher than the IPLs, Executive Intrusion is allowed and a conference is set up between the attendant, requested, and unrequested parties.

Operating parameters

The Option 11 implementation of Executive Intrusion can be used on an Option 11 in any environment where DPNSS1 connectivity is involved.

Executive Intrusion with prior validation is not supported.

Withdrawal from Intrusion is not supported.

Executive Intrusion has the same limitations as Post-Dial Attendant Break-In as follows:

- Only one Break-In/Executive Intrusion key is allowed per Attendant Console
- An Executive Intrusion connection cannot be put on hold
- Only one attendant at a time is allowed to intrude for a given connection, and
- Executive Intrusion is permitted only if the requested party is a BCS or PBX set and has Warning Tone Allowed (WTA) Class of Service.

In a full DPNSS1 environment, Executive Intrusion adds the following limitations:

- Executive Intrusion is permitted only if the unrequested party is a BCS or PBX set having Warning Tone Allowed (WTA) Class of Service,
- Executive Intrusion is not permitted if the requested or unrequested party is involved in a conference.

In a DPNSS1/Meridian Customer Defined Network (MCDN) gateway between the originating party and the requested party, Executive Intrusion is not permitted if Call Offer has been activated at the terminating node by the same attendant. Call Offer takes precedence over Executive Intrusion in a DPNSS1/MCDN gateway.

In a DPNSS1/MCDN or MCDN/DPNSS1 gateway between the originating party and the requested party, only Executive Intrusion activation requests from attendants are supported. Executive Intrusion from sets on a third party PBX are ignored in an DPNSS1 Initial Service Request Message (ISRM) and rejected in a DPNSS1 End-to-End Message (EEM).

At the gateway node, if mixed MCDN/DPNSS1 route lists are programmed, an incoming MCDN call using an outgoing DPNSS1 route for the first call attempt (without Executive Intrusion) will also use a DPNSS1 route for the Executive Intrusion request.

On the Option 11 the following hardware is required:

— DPNSS1 XPRI2 – NTAK799.

Feature interactions

Interactions with other DPNSS1 Supplementary Services

DPNSS1 Diversion

In the following scenario an Executive Intrusion request is made on a diverted call (Immediate). Set B has diversion immediate active to set C (set B is on a third-party PBX). Set C may be on the same node or on another node. C is busy on a call with another set. The attendant calls B. The answer to the Initial Service Request Message (ISRM) is a Number Acknowledge Message (NAM) with a Destination Address of C. The attendant position then sends a regular ISRM to C. Since C is busy, the attendant receives Clear Request Message (CRM) in response to the ISRM. The attendant presses the BKI key. In this case, an Executive Intrusion ISRM is sent to C, and C is considered the requested party.

In the following scenario an Executive Intrusion request is made on a diverted call (Busy). Set B has diversion on busy active to set C. Set C may be on the same node or on another node. Both B and C are busy on calls with other sets. The attendant sends a regular ISRM to C. Since C is busy, the attendant position receives a Clear Request Message in response. The attendant presses the BKI key. In this case, an Executive Intrusion ISRM is sent to C, and C is considered the requested party.

DPNSS1 Route Optimization

If the requested party is involved in a Route Optimization process when it receives an Executive Intrusion request, the request is rejected. Conversely, the originating, requested and unrequested parties will be able to send a Route Optimization request only after the Executive Intrusion conference reverts to a simple call. Finally, if an Executive Intrusion request is received after a Route Optimization Request Supplementary Information String has been sent but Route Optimization has not actually commenced, the Route Optimization process is aborted and the Executive Intrusion may proceed.

DPNSS1/Uniform Dialing Plan Interworking

DPNSS1/Uniform Dialing Plan Interworking does not affect Executive Intrusion operation, except with regard to displays. The Executive Intrusion states normally displayed are Coordinated Dialing Plan Calling Line IDs and Originating Line IDs. If a Uniform Dialing Plan is active in the network, displays will change to Uniform Dialing Plan Calling Line IDs and Originating Line IDs.

Executive Intrusion denied for the Wanted Node during DPNSS1 Three-party Service

Executive Intrusion will not be allowed if either the requested or unrequested party is involved in an enquiry call. In addition, Executive Intrusion will be denied if the requested party or the unrequested party is the controlling or the added-on party of a three-party conference call. The third party (the one held during the enquiry call before the conference is completed) is not subject to this restriction.

Step Back on Congestion

If Step Back on Congestion (SBOC) is active, an ISRM containing an Executive Intrusion request will undergo the SBOC routing process as per any other call.

Other Interactions

Attendant Blocking of DN

If an Executive Intrusion attempt is made for an Attendant Blocking of DN call, the Executive Intrusion attempt is denied.

Attendant Conference

If an Executive Intrusion conference is established on the Destination side, pressing the Attendant conference key is ignored.

Attendant Secrecy Enhanced Secrecy

If attendant secrecy is not active when the attendant attempts Executive Intrusion, the source is automatically excluded. If Enhanced Secrecy is equipped, source exclusion includes the removal of the Enhanced Secrecy warning tone when Executive Intrusion is activated.

Automatic Call Distribution (ACD)

Once the requested party has established the call with an ACD agent, the attendant is able to intrude into the call. However, if the requested party is in an ACD queue, Executive Intrusion is denied.

Break-In***Break-In to Enquiry Calls******Break-In with Secrecy******Break-In Indication – Prevention***

Executive Intrusion and Break-In are mutually exclusive. Pressing the BKI key will activate Break-In or Executive Intrusion. In addition, intrusion is not allowed into a Break-In conference.

Call Park

Attempts to intrude into a parked call receive Executive Intrusion Denied treatment.

Call Waiting

Executive Intrusion is permitted (consult-only state) into a requested party having call waiting.

Conference***Enquiry Calls***

Executive Intrusion is denied if the requested party is established in a local conference, or if the requested party is involved in an enquiry call. These restrictions may apply to the unrequested party depending on the connection being used between the requested and unrequested parties.

Data Calls

Executive Intrusion cannot be applied to data calls.

Hold or Permanent Hold

Executive Intrusion is denied if the requested party is put on hold by another station at the same node. This restriction also applies to the unrequested party if the unrequested party is located at the same node as the requested party (standalone) or if the requested party and the unrequested party are linked via DPNSS1.

Hunting

If Executive Intrusion is attempted against an extension with a Hunt DN configured, an attempt will be made to reroute the call to the hunt DN provided the Hunt DN is on the same node. If the Hunt DN is busy, this rerouting process is repeated. If all DN's in the Hunt chain are busy, Executive Intrusion is attempted against the wanted extension originally dialed. Otherwise, the call will terminate as a simple call on the first idle extension in the Hunt chain.

Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) Extension

Activation of Executive Intrusion for an ISDN BRI extension is not possible. Attempts to intrude on ISDN BRI extensions (either the requested or unrequested party) will fail.

Intercept Computer (Dial from Directory)

Executive Intrusion can be activated by dialing an extension DN from the Intercept Computer Terminal, and then pressing the BKI key on the Attendant Console.

Line Lockout

Executive Intrusion is not allowed for any set that is in Line Lockout state.

Make Set Busy Do Not Disturb

Executive Intrusion is not allowed if either of these features is active at the requested party.

Multiple Appearance DN

If the attendant tries to extend a call to a DN which appears on more than one set, this DN can either be:

- Multiple-Call Arrangement with Ringing (MCR): when a call terminates on this DN, all idle stations on which the DN appears are rung. The call is established only with the station which has answered first. All others are idle.
- Multiple-Call Arrangement with No Ringing (MCN): the only difference between MCN and MCR is that the called stations are not rung (only their DN keys flash).

- Single-Call Arrangement with Ringing (SCR): when a call terminates on this DN, all idle stations on which the DN appears are rung. The call is established only with the station which has answered first. All others are busy.
- Single-Call Arrangement with No Ringing (SCN): the only difference between SCN and SCR is that the called stations are not rung (only their DN keys flash).

Switchhook Flash

If a PBX (500/2500) set is part of an Executive Intrusion conference, any Switchhook Flash is ignored.

Feature packaging

DPNSS1 Executive Intrusion is included in Enhanced DPNSS1 Services (DPNSS_ES) package 288.

For configuration of Attendant Consoles the following package is required:

- Attendant Break-In/Trunk Offer (BKI) package 127.

For basic DPNSS1 network functionalities the following packages are required:

- Integrated Digital Access (IDA) package 122
- Digital Private Signaling System 1 (DPNSS) package 123
- International Supplementary Features (SUPP) package 131
- Integrated Services Digital Network (ISDN) package 145, and
- 2.0 Mbps Primary Rate Interface (PRI2) package 154.

The following package is required to provide DPNSS1 Loop Avoidance, Three-Party Service, Call Offer, Step Back on Congestion, and Route Optimization:

- DPNSS1 Network Services (DNWK) package 231.

The following packages are required to provide DPNSS1/MCDN Gateway functionality:

- Advanced ISDN Network Services (NTWK) package 148

- Network Attendant Services (NAS) package 159, and
- ISDN Supplementary Features (ISDNS) package 161 (required to support MCDN/DPNSS1 gateway with Loop Avoidance).

Feature implementation

Setup of the DPNSS1 Executive Intrusion is similar to that of the Attendant Break-in feature. It includes:

- Allowing warning tones for sets and trunks.
- Configuring Priority Levels for Forced Camp-on and Priority Override (PLEVs) for sets and routes. PLEV's for routes determine IPLs when applicable.
- PLEV/IPL mapping for sets.
- Configuring the BKI key on the Attendant Console.

LD 10 – Allow warning tone for PBX (500/2500) sets:

Prompt	Response	Description
REQ	CHG	Change.
TYPE	500	Telephone type.
TN	c u	Terminal Number.
CLS	WTA	Class of Service. Warning tone allowed (WTA) must be set for Executive Intrusion.

LD 11 – Allow warning tone for BCS (digital) sets:

Prompt	Response	Description
REQ	CHG	Change.
TYPE	aaaa	Telephone type, where aaaa = SL-1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, or 2616.
TN	c u	Terminal Number.
CLS	WTA	Class of Service. Warning tone allowed (WTA) must be set for Executive Intrusion.

LD 14 – Allow warning tone for trunks to permit Executive Intrusion:

Prompt	Response	Description
REQ	CHG	Change.
TYPE	aaa	Trunk type, where aaa = ADM, AID, ATVN, AWR, CAA, CAM, COT, CSA, DIC, DID, FEX, ISA, MDM, MUS, PAG, RAN, RCD, RLM, RLR, TIE, or WAT.
TN	c u	Terminal Number.
CLS	WTA	Class of Service. Warning tone allowed (WTA) must be set for Executive Intrusion.

LD 10 – Define PLEV for PBX (500/2500) sets:

Prompt	Response	Description
REQ	CHG	Change.
TYPE	500	Telephone type.
TN	c u	Terminal Number.
PLEV	n, (2)	Give PLEV n to the route ($0 \leq n \leq 7$).

LD 11 – Define PLEV for BCS (digital) sets:

Prompt	Response	Description
REQ	CHG	Change.
TYPE	aaaa	Telephone type, where aaaa = SL-1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, or 2616.
TN	c u	Terminal Number.
PLEV	n, (2)	Give PLEV n to the route ($0 \leq n \leq 7$).

LD 16 – Define PLEV for routes:

Prompt	Response	Description
REQ	CHG	Change.
TYPE	RDB	Route Data Block.
PLEV	n, (2)	Give PLEV n to the route ($0 \leq n \leq 7$).

The Meridian 1 ICL/IPL implementation uses the existing PLEV scale. PLEVs are defined in LDs 10 and 11 for sets, and LD 16 for routes. Make the IPL/PLEV mapping consistent with Priority Override/Forced Camp-On (POVR) operation in case both features exist.

The mapping is as follows:

— ICL/IPL for Attendants:

Since attendants do have any POVR priority, there is no PLEV – ICL and no PLEV – IPL mapping for attendants. When ICL information must be sent through DPNSS1, ICL = 3 (maximum capability level) is assumed for the attendant. When an Executive Intrusion request is received from another node, IPL = 3 (maximum protection level: non intrudable) is assumed for the attendant.

— ICL for sets:

Since sets cannot originate Executive Intrusion requests on the Meridian 1, there is no PLEV – ICL mapping for sets.

— IPL for sets (or routes):

Make the PLEV – IPL mapping consistent with the meaning of PLEV for the POVR feature.

The mapping is as follows:

Table 27
PLEV/IPL mapping for sets

PLEV of Set A	Meaning of POVR	IPL set A is considered to have	Meaning for Executive Intrusion
0	POVR not active: cannot override, cannot be overridden.	3	Total protection: cannot be intruded.
1	Cannot override, can be overridden by PLEVs 1-7.	0	Minimum protection: can be intruded by ICLs 1-3.
2	Can override PLEVs 1-2, can be overridden by PLEVs 2-7.	1	Intermediate protection: can be intruded by ICLs 2-3.
3	Can override PLEVs 1-3, can be overridden by PLEVs 3-7.	2	Intermediate protection: can be intruded by ICL 3.
4	Can override PLEVs 1-4, can be overridden by PLEVs 4-7.	3	Maximum protection: cannot be intruded.
5	Can override PLEVs 1-5, can be overridden by PLEVs 5-7.		
6	Can override PLEVs 1-6, can be overridden by PLEVs 6-7.		
7	Can override PLEV 7, can be overridden by PLEV 7.		

As a consequence, the effect on an incoming EI request (ICL included) on a set with a PLEV configured is the following:

Table 18
Effect of ICLs on different PLEVs for an EI request

ICL in the incoming EI request	PLEVs for which Executive Intrusion is allowed
1	1
2	1-2
3	1-3

LD 12 – Define a BKI/Intrusion key on the Attendant Console:

Prompt	Response	Description
REQ	CHG	Change.
TYPE	1250 or 2250	Attendant Console type.
TN	c u	Terminal Number for the Option 11.
KEY	xx BKI	Define key xx as the BKI key.

Feature operation

From Attendant Consoles the Executive Intrusion feature operates in a similar manner to that of the existing Attendant Break-In feature as follows:

- 1 The attendant dials the destination DN.
- 2 The attendant receives busy tone.
- 3 The attendant presses the Break-In (BKI) key on the console.
- 4 If the ICL on the Attendant Console is higher than the IPLs of both the requested and the unrequested parties, a conference is established between all three parties.
- 5 After the unrequested party disconnects, the attendant can extend the incoming call to another DN if desired.

DPNSS1 Extension Three Party Service

The DPNSS1 Three-party Service feature allows a controlling party to place an established party on hold and make an inquiry call to a third party. The controlling party may then transfer the held party to the inquired-to party, or form a three-party conference. The three parties may be located anywhere across a Meridian 1 DPNSS1 network.

The controlling party may use a 500/2500 set, M1000 series set, or Meridian feature telephone. On a 500/2500 set or M1000 series set, an inquiry call may be initiated by pressing the Recall key or performing a switch-hook flash. On a Meridian feature phone, an inquiry call may be initiated by pressing the Transfer or Conference key.

After a call transfer, this feature provides messaging that allows DPNSS1 Route Optimization supplementary service to be invoked, in order to optimize the routing of the call through the DPNSS1 network. Also, user set displays are updated, and applicable DPNSS1 access restrictions are applied. These include:

- restrictions configured as part of the Trunk Barring feature;
- Public Switch Telephone Network call barring, configured at the telephone set level;
- system restrictions dependent on trunk types (not configurable).

The following access restrictions are not supported:

- Tenant Service restrictions;
- Network Class of Service restrictions.

This feature handles various types of misoperation when the controlling party attempts to transfer from the held party to the inquired-to party. If the user of a Meridian feature phone presses the Transfer key a second time after having already pressed it once to transfer the call, the action is ignored.

For a 500/2500 set, misoperation may occur if the controlling party attempts to transfer after performing an unsuccessful inquiry call to the third party. The inquiry call may have failed due to the controlling party dialing an incomplete number, the inquiry call still being in the set-up stage, or the inquiry call encountering busy tone, overflow tone, or recorded announcement. The held call, if external, is intercepted to the attendant rather than dropped (the held call is dropped if is an internal call). However, in the cases of overflow and recorded announcement, if the inquiry call remains connected to the overflow tone or recorded announcement until time out occurs, then the held party is dropped.

Misoperation from a 500/2500 set is also prevented in cases where an inquiry call to the third party is successful, but a transfer connection between the held party and inquired-to party is prevented due to trunk-to-trunk access restriction. If the controlling set hangs up, then the inquiry call is disconnected. If the held call is external, it is recalled to the controlling party. If the held call is internal, it is disconnected.

In cases where a call transfer from a held party to an inquired-to party is successful when it should not have been allowed, the call is forced to disconnect.

Operating parameters

- None.

Feature interactions

- Within a mixed ISDN/DPNSS1 environment, all nodes with ISDN links must be equipped with the Network Attendant Service feature.
- As part of Multi-party Operation, a control digit (0-9, or an # or *) must be dialed to toggle, disconnect, or conference.
- If three-party conference is provided as part of Multi-party Operation, and if MPO is configured as 'disconnect during consultation connection', then a held party cannot be transferred directly from an inquiry — the controlling party must first form a three-party conference, and then hang up, in order to connect the held party to the inquired-to party as a simple call.

- If six-party conference is configured, up to six parties may be conference-in. If the controlling party hangs up during the conference, the conference is disconnected *if all remaining parties are trunks*. If at least one of the remaining parties is local, then the conference remains established. If the conference reaches a state where there is connection between a set on the controlling node and two other trunks, and the set disconnects, then there becomes a simple call connection between the two trunks. In a simple call connection, if one of the remaining parties is external, it becomes the originating party and the other becomes the terminating party. If both parties are external, this implies that at least one of the parties is a set. The set then becomes the originating party, and the other party becomes the terminating party.
- The held party may be transferred to the inquired-to party over an ISDN/DPNSS1 tandem. DPNSS1 calls may be held by the controlling party in the normal way.
- A call transferred to a party that has answered may be route optimized, upon completion of the transfer. A call transferred to a ringing set may be optimized upon answer. A held call at the originating or terminating node may be optimized upon being established in a simple call.
- Transfer after inquiry has priority over route optimization. If a node receives end-to-end messaging indicating ‘transferred’ after sending end-to-end messaging containing ‘route optimization’, the request for route optimization is aborted.
- Call Forward No Answer may override the DPNSS1 access restrictions placed on transfer after inquiry in the following scenario. An inquiry call is made to a set with Call Forward No Answer active. If a transfer is attempted while the inquired-to set is ringing, messaging is not sent to the controlling node. The DPNSS1 access restrictions are checked between the held party and the forwarding party, and not between the held party and forwarded-to party. If the forwarded-to party answers before the transfer is attempted, or if the call is successfully transferred before it is call-forwarded, then the DPNSS1 access restrictions are properly checked.

- Call Join allows a user of an M1000 series or 2000 series set, to conference into an active call, a party waiting on a secondary DN or the Call Waiting key. The call is then treated as a conference. If the controlling set disconnects during the conference, and if transfer is allowed, the remaining parties remain connected. Notification of the transfer is sent via end-to-end messaging.
- If an inquiry call is made to a busy set with Call Waiting active, the call is placed in call waiting to the inquired-to set. The controlling party, while receiving ringing, may transfer the call.
- If Multi-party Operation is equipped at the controlling node, the controlling party may toggle between the held party and inquired-to party, after the inquired-to party has answered the inquiry call from the controlling party.
- Multi-party Operation is a stand-alone feature, and does not support network-wide misoperation. It does allow local misoperation treatment to be configured for call transfer, for external and internal calls. The options that may be configured are ATN (route to attendant), DAR (disconnect after re-ring cycle of 1-15), AAR (route to attendant after re-ring cycle), OVF (overflow tone), DIS (disconnect), or STD (standard operation, which is disconnect for internal and route to attendant for external).
- DPNSS1 does not support either the Group Hunt or Group Hunt Queuing features.
- DPNSS1 operation will not support the following:
 - ISDN Basic Rate Interface (BRI) setsor
 - ISDN BRI Numeris Terminals.

Feature packaging

— DPNSS1 Network Services (DNWK) package 231

Dependencies:

- Digital Private Network Signaling System No. 1 (DPN) package 123;
- Integrated Digital Access (IDA) package 122, dependent on Digital Trunk Interface (PBXI) package 75, 2 Mbit Digital Trunk Interface (DTI2) package 129;
- International Supplementary Features (SUPP) package 131
- Basic Alternate Route Selection (BARS) package 57, dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Co-ordinated Dialing Plan (CDP) package 59, dependent on Dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Pretranslation (PXLT) package 92
- Flexible Numbering Plan (FNP) package 160
- Network Attendant Service (NAS) package 159, for a mixed ISDN/DPNSS1 environment
- If the toggle capacity is required, the Multi-Party Operations (MPO) package 142 for basic functionality, with the Flexible Tones and Cadences (FTC) package 125 and International Supplementary Features (SUPP) package 131 for enhanced functionality
- Incoming DID Digit Conversion (IDC) package 113, dependent on New Flexible Code Restriction (NFCR) package 49 and Network Class of Service (NCOS) package 32

Feature implementation

- **LD10-** Configure the transfer/conference capabilities.
 - *If Multi-Party Operation is not equipped*, in response to the CLS prompt, enter XFA/(XFD) to allow/(deny) transfer, or enter XFA/(XFD) to allow/(deny) three-party conference, or enter XFA or C6A/(C6D) to allow/(deny) six-party conference.
 - *If Multi-Party Operation is equipped*, in response to the CLS prompt, enter TSA/(XFD) to allow/(deny) three-party conference, or enter TSA or C6A/(C6D) to allow/(deny) six-party conference.
- **LD11-** In response to the KEY prompt, enter xx TRN for transfer, xx A03 for three-party conference, or xx A06 for six-party conference (where xx is the defined value).
- **LD95-** For the Calling Party Name Display data, configure the transfer indication mnemonic displayed on the telephone sets.
 - In response to the XFER prompt, enter the four-digit transfer indication mnemonic.

- **LD15-** Configure the Multi-party Operation attributes.
 - In response to the MPO prompt, enter YES.
 - In response to the CCDO prompt, enter YES/NO to allow/deny transfer after inquiry.
 - In response to the RALL prompt, enter YES/NO to allow/deny mandatory recall.
 - In response to the CDTO prompt, enter a value from 2-(14) to define the control digit for time out.
 - In response to the IFLS prompt, enter YES/NO to ignore/allow a switch-hook flash operation.
 - In response to the MHL D prompt, enter YES/NO to indicate whether or not manual hold is required.
 - In response to the PCDS prompt, enter YES/NO to allow/deny the entering of control digits.
 - In response to the CNFD prompt, enter a value from 0-(1)-9, or # or *, to define the control digit for conference.
 - In response to the TGLD prompt, enter a value from 0-(2)-9, or # or *, to define the control digit for toggle.
 - In response to the DISD prompt, enter a value from 0-(3)-9, or # or *, to define the control digit for disconnect.
 - In response to the FMPO prompt, enter YES to define flexible misoperation treatments for Multi-party Operation.
 - In response to the AOCS prompt, enter XXXX (treatment for internal calls) and YYYY (treatment for external calls), where XXXX and YYYY may be ATN (route to attendant), DAR (disconnect after re-ring cycle of 1-15), AAR (route to attendant after re-ring cycle), OVF (overflow tone), DIS (disconnect), or STD (standard operation, which is disconnect for internal and route to attendant for external).

DPNSS1 Loop Avoidance

The DPNSS1 Loop Avoidance feature prevents a DPNSS1 call from being looped through a network, due to errors in configuration, by placing a limit on the number of channels that a call may use.

A Loop Avoidance (LA) Supplementary Information String (SIS) has been added in all outgoing Initial Service Request Messages (ISRM)s, for each call at the originating PBX. The SIS contains a parameter that sets the limit on the number of DPNSS1 transit nodes that a call may use, as defined in the customer data block (overlay 15). The maximum value to which this limit may be defined is 25.

At each Meridian 1 transit node, the parameter of the Loop Avoidance Supplementary Information String is decreased by one, and a check is done to see if the limit has been reached. If the limit has not been reached, an Initial Service Request Message is sent along the outward channel to route the call onward. If the limit has been reached, the call is cleared back to the originating node and the originating exchange receives a Clear Request Message (CRM) message. The request message contains a specific clearing cause of Network Termination and a Loop Avoidance Supplementary Service.

The call is treated as if clearing has occurred due to congestion. If configured, alternative routing using Step Back on Congestion is attempted at the an originating only, if all of the available routes for the call have not been used. If alternative routing using Step Back on Congestion is not available, the treatment that the call receives depends on the originating party.

If the originating party is a non-ISDN trunk, the originating party receives congestion treatment as customer-defined in the customer data block (overlay 15). This may be busy or overflow tone. If the call was routed due to Network Alternate Route Selection (NARS), NARS call blocking intercept treatment is given (either overflow, busy, recorded announcement, or route to attendant). If the originating party is an ISDN trunk, the originating party receives congestion treatment as customer-defined in overlay 15 (busy or overflow).

If the originating party is a local set, treatment depends on the customer-defined congestion treatment (either busy or overflow) or NARS call blocking intercept treatment (either overflow, busy, recorded announcement, or route to attendant). If the originating party is a local attendant, busy indication is given. At this point, the DPNSS1 Attendant Camp-on feature may not be used.

If a Meridian 1 transit node receives an Initial Service Request Message that does not contain a Loop Avoidance Supplementary Information String, before the ISRM is sent over a new channel, a Loop Avoidance Supplementary Information String is added to the ISRM. The Loop Avoidance parameter is set to the pre-defined Loop Avoidance limit (as programmed against the TNDM prompt in the Customer Data Block, overlay 15) less one, to account for the incoming DPNSS1 channel.

The Loop Avoidance Supplementary Information String is ignored at a terminating Meridian 1 node that is not a gateway. If a terminating Meridian 1 node is a DPNSS1 to ISDN gateway, then the call is cleared back if the loop avoidance limit has been reached. If the ISDN Call Connection Limitation (ICCL) feature is equipped, the Loop Avoidance Limit is used to create the ICCL Tandem Threshold Limit in the outgoing SETUP message.

Operating parameters

- The intercept treatment for Network Alternate Route Selection calls that are blocked, configured in overlay 15 in response to the INTR prompt, should be the same as that for calls receiving Loop Avoidance call-back treatment, configured in overlay 15 in response to the CONG prompt.

Feature interactions

- Calls extended by the attendant across a DPNSS1 trunk contain a Loop Avoidance String, with the value of the loop avoidance parameter being customer-defined in overlay 15.

- A Loop Avoidance Supplementary Information String is included in an Initial Service Request Message requesting the following:
 - Camp-on/Call offer
 - Route optimization call set-up
 - DPNSS1 Call Back When Next Used
 - DPNSS1 Call Back When Free
 - DPNSS1 Redirection
 - DPNSS1 Three Party Service inquiry call
- The DPNSS1 Attendant Camp-on feature may not be used following call failure due to loop avoidance.
- DPNSS1 Call Back When Free cannot be used from an originating set receiving overflow as a loop avoidance clear-back treatment.
- After originating a DPNSS1 call, a Meridian 1 will attempt a new call if a Divert Immediate or Busy Instruction is received in a Number Acknowledgment Message (NAM). If the originating item is ISDN containing a Tandem Count value, this value is used to determine the Loop Avoidance Limit of the new DPNSS1 call; otherwise, the Tandem Count value defined in the Customer Data Block, overlay 15, is used.
- The Loop Avoidance Limit configured at an originating DPNSS1 Meridian 1 overrides the Step Back On Congestion configuration at a transit PBX.
- When a call transfer occurs over DPNSS1 links, the held and inquiry segments of the call must not individually exceed the Loop Avoidance parameter limit for the DPNSS1 channels that are used. On completion of the call transfer, the limit may be exceeded.
- Remote Virtual Queuing is not allowed on an ISDN call cleared back due to Tandem Threshold Exceeded.
- If an incoming DPNSS1 or ISDN call is call forwarded all calls on busy over a DPNSS1 or ISDN trunk, the Loop Avoidance Limit of the incoming call is used for the forwarded call.

- If the ISDN Call Connection Limitation (ICCL) feature is equipped, when an ISDN call reaches the terminating Meridian 1 node, it returns the Tandem Threshold count in the ALERT message to the originating node. If an ISDN call encounters a DPNSS1 gateway while being channeled, the complete tandem count is not known since DPNSS1 does not pass this information back to the originating node. Therefore, the ICCL Tandem Threshold count in the ALERT message passed from the DPNSS1 gateway to the originating node is incorrect (the actual value returned is that received at the gateway node, increased by one).

For the outgoing portion of a call, the gateway will use the received value of the Loop Avoidance Supplementary Information String or Tandem Count to adjust the Tandem Count or Loop Avoidance Limit information.

- DPNSS1 operation will not support the following:
 - ISDN Basic Rate Interface (BRI) setsor
 - ISDN BRI Numeris Terminals.
- When an incoming DPNSS1 call to a local station hunts across a DPNSS1 trunk, the Loop Avoidance Limit will be used for the outgoing call to avoid the possibility of a call looping continuously because of the Call Hunt feature.

Feature packaging

— DPNSS1 Network Services (DNWK) package 231

Dependencies:

- Digital Private Network Signaling System No. 1 (DPN) package 123;
- Integrated Digital Access (IDA) package 122, dependent on Digital Trunk Interface (PBXI) package 75, 2 Mbit Digital Trunk Interface (DTI2) package 129;
- International Supplementary Features (SUPP) package 131
- Basic Alternate Route Selection (BARS) package 57, dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Network Alternate Route Selection (NARS) package 58
- Co-ordinated Dialing Plan (CDP) package 59, dependent on Dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Pretranslation (PXLT) package 92
- Network Attendant Service (NAS) package 159;
- Flexible Numbering Plan (FNP) package 160
- For the ISDN Call Connection Limitation (ICCL) feature, the following packages are required:
 - ISDN Supplementary features (ISDN SUPP) package 161
 - Network Attendant Services (NAS) package 159
 - Integrated Services Digital Network (ISDN) package 145
 - ISDN Primary Rate Access (PRA) package 146 or ISDN Integrated Services Link (ISL) package 147

Feature implementation

- **LD15-** In the Customer Data Block, define the Loop Avoidance Limit for DPNSS1 calls or the Tandem Threshold Limit for ISDN calls.
 - If the ISDN and ICCL packages are equipped, enter YES to the ISDN prompt. This causes the TNDM prompt to be displayed. In response to the TNDM prompt, enter a value from 0-(15)-31 to define the Tandem Threshold Limit for ISDN calls.
 - If the ISDN and ICCL packages are not equipped, the ISDN prompt does not appear. The TNDM prompt is displayed automatically. In response to the TNDM prompt, enter a value 0-(15)-25 to define the Loop Avoidance Limit for DPNSS1 calls.

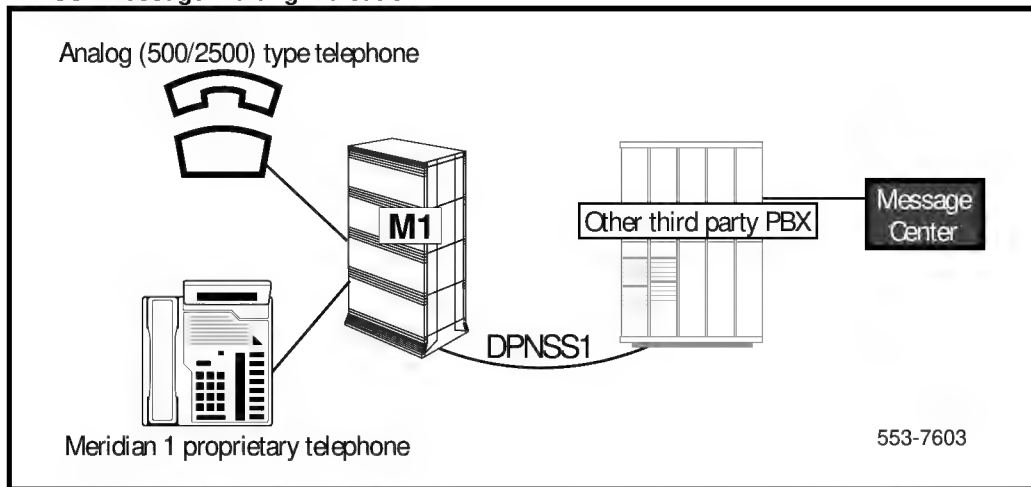
DPNSS1 Message Waiting Indication

With the DPNSS1 Message Waiting Indication (DMWI) feature, Meridian users can subscribe to a third party voice message system across a Digital Private Network Signalling System No. 1 (DPNSS1) network.

When provisioned, this feature provides a means to pass Message Waiting Indication across a private DPNSS1 network with Meridian 1 and other third party PBXs. This feature allows the Meridian 1 to recognize DPNSS1 Non-Specified Information (NSI) from a third party voice message node. This recognition capability allows a voice message system located on another node to notify or cancel Message Waiting Indication for Meridian 1 users.

Figure 24 illustrates DPNSS1 Message Waiting Indication.

Figure 24
DPNSS1 Message Waiting Indication



DPNSS1 Message Waiting Indication interworks with the DPNSS1 Call Diversion feature. The DPNSS1 Call Diversion Feature automatically routes an incoming trunk or an internal call to a third party voice message node if the call is not answered on the Meridian 1 node. When a calling party leaves a message for the called party, the voice message node sends a message waiting notification to the controlling node. When the called party retrieves the voice message, a message waiting cancellation is sent by the host node to the controlling node where the Meridian 1 user is located.

For telephones equipped with a visual message waiting device such as an LCD or LED, message notification is provided by lighting the device and message cancellation by switching off the device. Otherwise, the indication and cancellation is provided by an audible indication when the called party goes off-hook.

Operating parameters

DPNSS1 Call Diversion feature is a prerequisite for the DPNSS1 Message Waiting Indication feature. With DPNSS1 Call Diversion, one of the following redirection features must be configured: Call Forward All Calls, Call Forward No Answer, Call Forward by Call Type, Call Forward Busy, Hunting/Group Hunting, ICP Forward All Calls or Internal Call Forward.

This feature is only supported on analog (500/2500 type) sets and Meridian 1 proprietary sets.

DPNSS1 Message Waiting Indication is supported across Analog Private Network Signaling System (APNSS).

The size of a parameter for a Message Waiting Indication non-specified information (NSI) string is limited to 80 characters. The size of all parameters for a Message Waiting Indication non-specified information (NSI) string is limited to 126 characters. String size limitations do not include octothorpe (#) or asterisk (*) delimiters.

The DPNSS1 Message Waiting Indication does not check the presence and validity of a suffix following a non-specified information identifier.

This feature supports Coordinated Dialing Plan (CDP) and Uniform Dialing Plan (UDP).

The total limit of configured Message Waiting Indication (MWI) Non-Specified Information (NSI) tables must not exceed 512. The size of an MWI NSI consists of adding up the table's number of parameters, the total number of characters for the table's parameters and the number 7. Any creation or change that causes this limit to be exceeded, results in the output of an error message (SCH0097).

Any number of DPNSS1 trunks can be involved in the path between the Voice Messaging System and the Meridian 1. However, if a non-DPNSS1 trunk is involved in this path, then the DPNSS1 Message Waiting Indication feature is not supported. If this occurs, the Message Waiting Indication NSI is not passed at the gateway node.

The calling party, the originating node, and the called party, the controlling node, can be the same. When this occurs, the local call is forwarded to a Voice Messaging System across DPNSS1.

Feature interactions

Network Messaging Service

With the DPNSS1 Message Waiting Indication feature, no gateway functionality between Integrated Services Digital Network (ISDN) and DPNSS exists for Meridian Mail access or message waiting capabilities.

Feature packaging

The DPNSS1 Message Waiting Indication requires DPNSS Message Waiting Indication (DMWI) package 325.

All Meridian 1 nodes require the following packages:

- Integrated Digital Access (IDA) package 122
- Digital Private Network Signaling System (DPNSS) package 123

The Meridian 1 originating node (i.e. node with calling party) and controlling node (i.e. node with Message Center users) require DPNSS1 Network Services (DNWK) package 231 for the DPNSS1 Call Diversion feature.

Meridian 1 controlling nodes require the following packages:

- End-to-End Signaling (EES) package 10
- Message Waiting Center (MWC) package 46

For an audible Message Waiting Indication on analog (500/2500 type) sets, Flexible Tones and Cadences (FTC) package 125 is required.

For a Message Waiting announcement, Message Intercept (MINT) package 163 is required.

Feature implementation

Note: Prior to configuring DPNSS1 Message Waiting Indication, the DPNSS1 Call Diversion feature must be configured and one of the following redirection features must also be activated: Call Forward All Calls, Call Forward No Answer, Call Forward by Call Type, Call Forward Busy, Hunting/Group Hunting, ICP Call Forward All Calls and Internal Call Forward. To configure, refer to the DPNSS1 Call Diversion feature in this guide.

LD 15 – Add, change or delete a Message Waiting Indication NSI table.

Prompt	Response	Description
REQ	NEW CHG	Add new data. Change existing data
TYPE	NET	Networking data block.
CUST	xx	Customer number.
...		
DMWM	YES	Enable output of error messages. (NO) = disables output of error messages (default).
MWNS	YES	Recognize Message Waiting Indication NSI string. (NO)= Do not recognize Message Indication NSI string (default).
- REQ	(NEW)	Create new NSI table (default). OUT = Delete Message Waiting Indication table.

- MFID	a	Enter the Manufacturer Identifier of the Message Waiting Indication NSI table to add, change, or delete, where a = any alpha character or <CR>. Note: SCH9996 message will appear if the command CHG is entered and no Message Waiting Indication NSI tables corresponds to the alpha character entered. When this occurs, the MFID prompt is re-prompted. Note: SCH0097 will appear if the NEW or CHG commands are entered and if the number of MWI NSI tables for the customer exceeds the limit (512). Note: If the prompt XALL is entered, then all existing Message Waiting Indication NSI tables are deleted.
- - NOTI	YES NO	YES = NSI string for Message Waiting Notification. If NO or <CR> is entered on NEW command then the SCH0274 message is output. If NO or <CR> is entered on CHG command then CANC is prompted.
- - MSSC	a	Note: Manufacturer specific service character for MW notification where a = any alphanumeric character is accepted for an SIS parameter. If <CR> is entered on NEW command then the SCH0274 message appears and MSSC is re-prompted. If <CR> is entered on CHG command then PRMT prompt appears. Note: If a = a character that is not an alphanumeric character, then SCH008 appears and MSSC is reprompted.
- - - PRMT	aaa	NSI parameter(s) for Message Waiting Notification, where aaa = any alphanumeric sequence is accepted for a SIS parameter to a maximum of 126 characters. PRMT appears until <CR> is entered. Note: If aaa includes a character that is not an alphanumeric character, then SCH008 appears and PRMT is reprompted.
- - CANC	YES NO	YES = NSI string for Message Waiting Cancellation. If NO or <CR> is entered on NEW command then the SCH0274 message appears and CANC is re-prompted. If NO or <CR> is entered on CHG command then the MFID prompt appears.

--- MSSC	a	Manufacturer specific service character for Message Waiting cancellation where a = any alphanumeric character is accepted for an SIS parameter.
--- PRMT	aaa	NSI parameter(s) for Message Waiting Cancellation where aaa = any alphanumeric sequence is accepted for an SIS parameter to a maximum of 126 characters. PRMT appears until <CR> is entered. Note: When REQ = CHG, both cancellation and notification, once <CR> is entered at the PRMT prompt, the only parameters kept are the ones that have just been entered. Any existing parameters not re-entered are removed from the MWNS.

LD 10 – Allow Message Waiting Class of Service.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	500	Type of telephone set.
TN	c u	Terminal Number.
...		
CLS	MINA	Message Interrupt Allowed MIND = Message Interrupt Denied (default).
CLS	MWA	Message Waiting Allowed. MWD = Message Waiting Denied (default).

Note: To receive an announcement as a message waiting indication, analog (500/2500 type) sets must configure the Message Intercept feature and activate Flexible Tones and Cadences (FTC) in LD 56.

LD 56 – Message Intercept and Flexible Tones and Cadences.

Prompt	Response	Description
REQ	NEW, CHG	Add new data. Change existing data.
TYPE	FTC	Flexible Tones and Cadences data block.
TABL	0 - 31	Flexible Tones and Cadences Table number.
...		
MINT	YES	Allow tones or announcements. NO = Deny tones or announcements (default).
- MWAN	0 - 255 0 - 255	Message Waiting.

Note: If the Message Intercept feature is not equipped, a Message Waiting dial tone is provided on a set basis if this tone has been defined in Tones and Cadences data block in Overlay 56. Or, Call Forward Message Waiting tone is provided if Call Forward Message Waiting has been defined in Overlay 56 and the set has Call Forward Active.

LD 11 – Allow Message Waiting Class of Service.

Prompt	Response	Description
REQ:	NEW CHG	Add new data. Change existing data.
TYPE:	xxxx	Telephone type, where: xxxx = SL1, 2006, 2008, 2009, 2016, 2018, 2112, 2216, 2317, 2616, or 3000.
TN	c u	For Option 11C.
...		
CLS	MWA	Message Waiting Allowed. (MWD) = Message Waiting Denied (default). If CLS = MWA and no Message Waiting Key (MWK) is defined, then broken dial tone is provided for message waiting notification.

Feature operation

No specific operating procedures are required to use this feature.

DPNSS1 Night Service

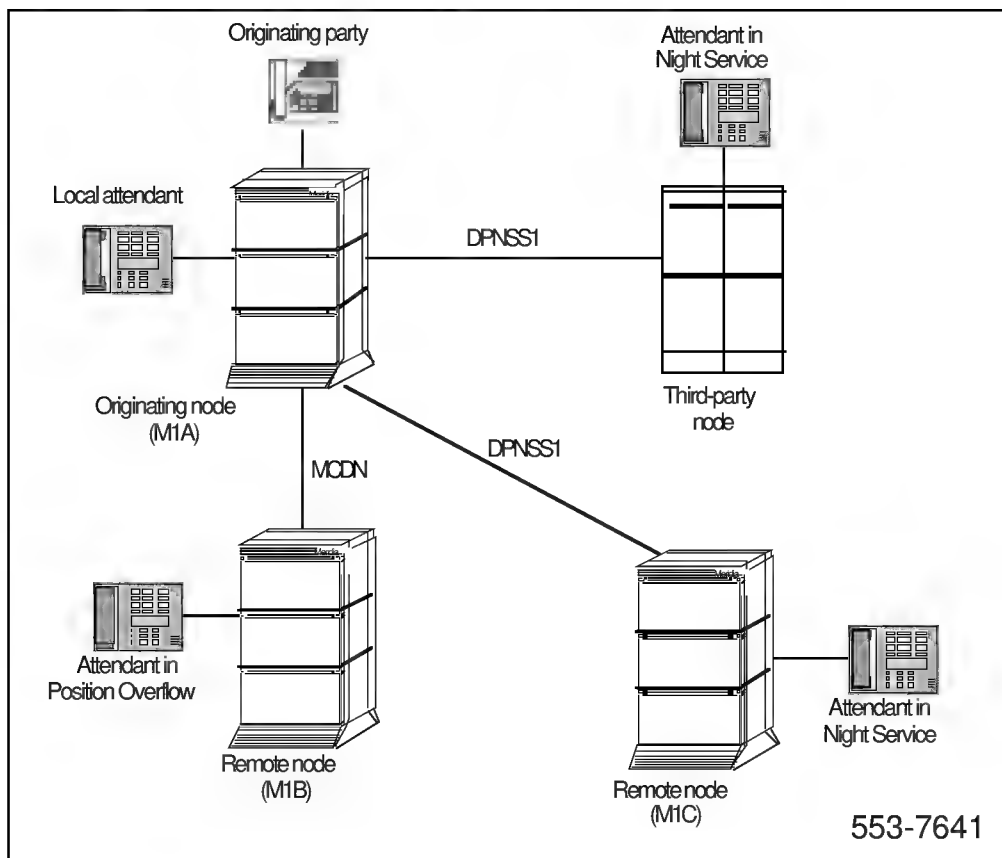
The Digital Private Networking Signaling System No.1 (DPNSS1) Night Service feature introduces the “Diversion via a Different Channel” capability of the DPNSS1 Night Service Supplementary Service. That is, it allows a Meridian 1 to treat a third-party PBX’s request to divert a call queued to an attendant that is in Night Service mode, back to the local attendant queue of the originating DPNSS1 node.

The following example illustrates a DPNSS1 Night Service call processing scenario. Also refer to Figure 59.

A DPNSS1 call from the originating Meridian 1 node (M1A) terminates to the attendant on a third-party PBX. The attendant is in Night Service. The third-party PBX signals the Meridian 1 to initiate Night Service Diversion. The call is then diverted back to the originating node, where a new call is initiated to the queue of the local attendant.

Note: This diversion is the functionality that has been introduced by the DPNSS1 Night Service feature. The call processing which follows is part of the standard Network Attendant Service (NAS) functionality.

At this point, the call is treated as a standard call to the local attendant. If the local attendant is also in Night Service, Network Attendant Service (NAS) routing is applied. The call is routed to a remote attendant (on M1B.) Since this attendant is in Position Overflow, it cannot take the call and clears it. The next alternative in the NAS routing table is tried, which is for the originating Meridian 1 to route the call to the remote attendant (M1C). Here, the attendant is also in Night Service and clears the call. Eventually, the Night DN is tried successfully. The new call from the originating Meridian 1 to the NIGHT DN is kept, and the old call to the third-party PBX is released.

Figure 59- Example of DPNSS1 Night Service Diversion

Operating parameters

None applicable.

Feature interactions

DPNSS1 Redirection

A redirected call may undergo Night Service Diversion, if a new call is attempted to an attendant on a third-party PBX that initiates Night Service Diversion.

DPNSS1 Route Optimisation

Route Optimisation is applied if a non-optimum path has been taken by a call answered by either the third-party PBX on which the target operator is located, the local attendant, remote attendant, or the Night DN.

DPNSS1 Step Back on Congestion

If a call to the remote attendant encounters congestion, Step Back on Congestion is initiated and attempted at any node.

DPNSS1 Extension Three Party Service

An enquiry call reaching an attendant in Night Service will undergo Night Service diversion, if available.

Diversion

A diverted call reaching an attendant in Night Service will undergo Night Service diversion, if available.

Attendant Incoming Call Indicators

When a Night Service call is diverted to an attendant, the Incoming Call Indicator is the number of the incoming route (this is the same as for a NAS MCDN call routed to an attendant.)

Call Waiting

If a call is diverted to a third-party operator Night DN that is busy, Call Waiting may be activated (if equipped). The call to the third-party operator PBX is released.

Feature packaging

The following software packages are required for the DPNSS1 Night Service feature:

For basic DPNSS1 network functionality:

- Integrated Digital Access (IDA) package 122;
- Digital Private Networking Signaling System No.1 (DPNSS) package 123;
- 2.0 Mbps Primary Rate Interface (PRI2) package 154.

For enhanced functionality:

- International Supplementary Features (SUPP) package 131;
- DPNSS1 Networking Services (DNWK) package 231.

For Network Attendant Service interworking:

- Integrated Services Digital Network (ISDN) package 145;
- Advanced ISDN Network Services (NTWK) package 148;
- Network Attendant Service (NAS) package 159;
- ISDN International Features (ISDN INTL SUP) package 166 (to support the MCDN/DPNSS1 gateway with Loop Avoidance.)

Feature implementation

The following steps are required to configure the DPNSS1 Night Service feature:

LD 15 - Configure the local attendant DN.

Prompt	Response	Description
REQ	CHG	Change the existing data.
TYPE	ATT	Attendant consoles data.
CUST	0-31	Customer Number.
- OPT	aaa	Options
- ATDN	(0)-xxxx(xxx)	Four-digit Attendant Directory Number (up to seven digits with the Directory Number Expansion (DNXP) package 150.)
...		

LD 15 - Configure the Night Service DN.

Prompt	Response	Description
REQ	CHG	Change the existing data.
TYPE	NIT	Night Service data.
CUST	0-31	Customer Number.
- NIT1	xxxx	First Night Service DN.
...		

LD 86 - Define the Remote Attendant data.

Prompt	Response	Description
REQ	CHG	Change the existing data.
CUST	0-31	Customer Number.
TBL	(0)-63	NAS routing table. 0 is the customer routing table; it is also associated with Attendant Console Group 0.
ALT	1-7	Attendant Alternative number.
ID	x....x	Digits (up to 16) dialed to reach a remote attendant.
TODS	1-31	Schedule period to be changed.

DPNSS1 Redirection

The DPNSS1 Redirection feature allows a DPNSS1 call that is extended by an attendant and not answered after a defined period of time, to be recalled to an attendant. This attendant may be the attendant that originally extended the call, or another attendant on the same or different node within the network.

Note: The DPNSS1 Redirection feature is required for DPNSS1 networks using a Centralized Operator Service, if the network nodes on which operator consoles are located use DPNSS1 Redirection to provide timed operator recall functionality. If operator consoles are located on a Meridian 1 PBX, timed operator recall is provided by the DPNSS1 Timed Recall feature described in this section.

When an attendant extends a call to a destination, and the destination does not answer before the attendant releases the call, information is passed to the originating DPNSS1 node to initiate recall timing. If the information indicates that the destination is free, then the slow answer recall timer is started. If the information indicates that the destination is busy, then the camp-on recall timer is started. For camp-on timing, if the destination party becomes free before the camp-on timer expires, then the destination party receives ringing. The camp-on timer is canceled, and the slow answer recall timer is started.

If the destination answers the call extension before the recall timer expires, the recall timer is canceled and the source and destination are connected. If the recall timer expires before the call extension is answered, a new call is initiated to the local attendant. If the local attendant is not available, Network Attendant Service (NAS) routes the call to another node. If the call reaches a state of attendant receiving buzzing, attendant receiving ringing, or queued to attendant, then the originating party is connected to the new call and the original call is dropped.

If a new call cannot be established, a Clear Request Message (CRM) is sent to the originating node and the original call remains connected. If the original call, while in call waiting or camp-on, is answered by the destination party before the new call has attained ringing state is, a Call Connected Message (CCM) is sent to the originating node. The new call is cleared and the original call remains connected.

Operating parameters

- The DPNSS1 Three Party Service must be equipped in order for the Redirection feature to function, since the Redirection feature uses the Three Party Service messaging to perform recall timing.
- Special care must be taken when configuring NAS routing for call redirection. If NAS routing is to be used to make the redirected call, a Location Code (LOC) or Distant Steering Code (DSC) must be used and entered in response to the ID prompt in overlay 86. The digits entered for the ID prompt in must allow the call to be routed immediately, without any timing. It is strongly suggested that separate DSCs be used for programming the NAS alternatives.

Flexible Numbering must not be used for the configuration of the NAS alternatives. The prompt FLEN should be given a value of “0” in overlay 87 for the DSC and in overlay 90 for the LOC.

Since there is no system verification during configuration, it is up to the craftsperson to ensure proper programming. If these guidelines are not followed, when the new call is attempted, it will be dropped and the old call retained.

Feature interactions

- The Redirection feature does not apply to calls passing through an DPNSS1/ISDN gateway. If a call comes in from an originating node over an ISDN trunk, passes through a Meridian 1 gateway PBX, is routed to an attendant over a DPNSS1 trunk, and is then extended to a set over a DPNSS1 trunk, then the Redirection feature may only initiate recall timing at the ISDN/DPNSS1 boundary.
- The destination party must be within the DPNSS1 or DPNSS1/ISDN network in order for recall timing to be activated at the originating node.
- If the destination party to which call waiting or camp-on is applied is on a non-Meridian 1 node, or on a node that does not treat call waiting as does a Meridian 1 node, then it may not be possible to distinguish a call waiting call from a camp-on call. In this case, the call is timed as it were a camp-on call.
- If an attendant at one node is established in a call to an attendant at another node, this feature does not apply if the second attendant transfers the call.

- If Attendant Forward No Answer is active, a call that has been redirected to an attendant may be passed from one console to another, if the call has been presented but not yet answered. The previous console is placed in night service. If a call is called is passed to the last console which is service, the call is passed from this console to the night DN.
- If a call is extended from an attendant node that relies on the originating node for recall timing using the Redirection feature, to a ringing set on a Meridian 1 node with Call Forward No Answer (CFNA) active, the recall timing takes precedence over the CFNA timing. When the call is extended to the set, the recall timer is started at the originating node. When the set begins to ring, the CFNA timer is started. If the CFNA timeout is less than the recall timer timeout, then the call is forwarded to the CFNA DN. The CFNA DN is rung until the recall timer expires, at which time the CFNA DN stops ringing and the call is routed to the attendant. If the CFNA timeout is greater than the recall timer timeout, then, when the recall timer expires, the set ceases to ring and the call is routed to the attendant rather than to the CFNA DN.
- Redirection timing is not done at a Meridian 1 DPNSS1 originating node for DPNSS1 calls transferred from sets.
- DPNSS1 Loop Avoidance string (LA) added for a normal call is also added to the redirected call.
- If a redirected call encounters congestion, the DPNSS1 Step Back on Congestion feature, if active, may cause the call to step back. Another call may be redirected using an alternate, non-congested route.
- During system initialization, calls not yet established are dropped.
- After the Redirection recall timer expires, recalls to the attendant leave only the source active, with the destination being dropped. Therefore, there is no splitting with the Redirection feature.

- The Slow Answer Modification feature may be used in a mixed network environment consisting of attendant nodes that do their own recall timing, and nodes using the Redirection feature for recall timing. This application would result in a more consistent console operation within the network. Where recall timing is done by the attendant node, when a recall occurs to the attendant, the Slow Answer Modification feature causes the destination to be dropped when the attendant answers the recall. Where recall timing is done by the Redirection feature, when a recall occurs to the attendant, the source remains active while the destination is dropped.
- After the Redirection recall timer expires, a call extended by an attendant may or may not recall to the attendant that originally extended the call, since the original call is dropped and a new call is originated.
- DPNSS1 does not support either the Group Hunt or Group Hunt Queuing features.
- DPNSS1 operation and features are not supported with ISDN Basic Rate Interface (BRI) or BRI trunks.

Feature packaging

— DPNSS1 Network Services (DNWK) package 231

Dependencies:

- Digital Private Network Signaling System No. 1 (DPN) package 123;
- Integrated Digital Access (IDA) package 122, dependent on Digital Trunk Interface (PBXI) package 75, 2 Mbit Digital Trunk Interface (DTI2) package 129;
- International Supplementary Features (SUPP) package 131
- Basic Alternate Route Selection (BARS) package 57, dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Co-ordinated Dialing Plan (CDP) package 59, dependent on Dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Pretranslation (PXLT) package 92
- Network Attendant Service (NAS) package 159
- Flexible Numbering Plan (FNP) package 160

Feature implementation

- **LD15-** In the Customer Data Block, define the parameters for recall timers and the attendant DN.
 - In response to the ATDN prompt, enter the attendant DN. Recalls occur to this DN, upon expiration of the recall timer.
 - In response to the RTIM prompt, enter a value for the slow answer recall timer (0-(30)-378), camp-on recall timer (0-(30)-510), and call waiting recall timer (0-(30)-510). Note that for recalls timed at the local node, no distinction is made between call waiting calls and slow answer recalls. The slow answer value is used in both cases.

DPNSS1 Route Optimization

The DPNSS1 Route Optimization feature has been developed to optimize trunk usage within a DPNSS1 network, by replacing non-optimum call paths through a DPNSS1 private network with optimum paths. An optimum path is the path that uses only the first choice routes to link two PBXs across the network. The first choice is determined by the programming of the network numbering and routing at each PBX. This optimization applies to established simple voice calls which were routed during set-up, or transferred or attendant-extended to another party.

Route optimization is initiated by the originating PBX, after recognizing that a DPNSS1 call may have been set up over a non-optimum path due to alternative routing or call modification. If the call is ringing, the originating PBX waits for an answer signal before initiating optimization. If the call has been transferred, on answer, or attendant-extended to a another party, then the transfer or extension signaling sequence initiates the optimization.

The originating PBX sends a Route Optimization Request message, which contains a Call Reference Number (CRN) field, to the terminating PBX. The CRN is used as a destination address to route the call back to the originating PBX and uniquely identify the call being optimized (the Originating Line Identity sent in the Initial Service Request Message is used for this purpose). The set-up message for the backward call contains a field that identifies the call set-up as route optimization. This causes the call, throughout its path, to be restricted to only first choice routes.

If the route optimization request call set-up successfully gets back to the originating PBX, a conference is established at the originating node between the originating party, the original path still carrying the speech, and the silent new path. A message of acknowledgment is returned to the terminating PBX on the new path. Upon receiving this acknowledgment, the terminating PBX replaces the old path with the new (optimized) path, and sends a connect indication across the new path to the originating PBX. The old path is silenced. Upon receiving the connect indication, the originating PBX terminates the conference, connects the originating party to the optimized path, and clears the original path.

If the route optimization request call set-up fails, the originating PBX receives a notification message that the route optimization request was not successful. The originating PBX may then attempt route optimization again, at 60 second intervals. During this interval, the Meridian 1 may initiate route optimization requests for other DPNSS1 calls.

A customer may define the following route optimization options in overlay 15, the Customer Data Block:

- NRO (no route optimization). Route optimization is inhibited for all calls (this option would typically be used on PBXs having high levels of call traffic).
- ROA (route optimization for alternatively routed calls). Route optimization is initiated for calls which have undergone alternative routing. A call is considered to be alternatively routed if it originated over a route which was not the first choice route, or if alternative routing indication is sent in the Routing Information (RTI) of a Network Indication Message (NIM).
- ROX (route optimization for transferred calls). Route optimization is initiated for transferred or attended-extended calls.
- RAX (route optimization for transferred or alternatively routed calls). Route optimization is initiated for calls which have been alternatively routed, such as by Step Back on Congestion, or for transferred or attended-extended calls.

Operating parameters

- While a PBX may response to simultaneous requests for route optimization, only one call at a time may be optimized from any PBX (this is to prevent ambiguity as to which call is being optimized if a route optimization request was simultaneously made for two or more calls on the same DN of a multiple appearance DN).
- Care must be taken when configuring the incoming and outgoing digit manipulation for the Meridian 1, so that when the insert (INST) digits followed by the Call Reference Number (CRN) are dialed at the terminating PBX, then the call is routed back to the originating PBX.

- Some special configuration needs have to be considered for the optimization of incoming trunk calls. If the Coordinated Dialing Plan (CDP) uses Local Steering Codes (LSCs), then the prompt LSC has to be configured in overlay 15. If the CDP uses only Distant Steering Codes (DSCs) as part of the DNs, then a Trunk Steering Code (TSC) has to be configured at each network node, for each network non-DPNSS1 trunk in the network.
- For a Coordinated Dialing Plan (CDP) configuration, each steering code (Distant or Trunk) has to be defined, in overlay 87, with a Flexible Numbering Plan (FLEN) prompt other than 0 in order to have route optimization working.
- Route optimization may be applied on a private line, which may cause the private line being removed from a call and replaced by another trunk. This may likely occur when a call is being transferred. It is recommended that a network is not configured to have calls alternatively routed to private lines or alternatively routed after using private lines.
- When defining a numbering plan, the insert (INST) digits followed by the Call Reference Number (CRN) should exactly represent the digits to be dialed to reach the DN represented by the Originating Line Identity (OLI) in the Route Optimization Request message.

Feature interactions

- Route optimization is only supported on DPNSS1/APNSS trunks. If a call from a non DPNSS1/APNSS trunk comes in to a set within a DPNSS1 network, the call takes the optimum path (if route optimized) from the non DPNSS1/APNSS trunk to the set.
- Access restrictions placed on sets give them pretranslation, which prevents the sets from dialing certain numbers (a different DN is substituted for the dialed DN). When implementing route optimization, access restriction must not be set up to substitute a dialed DN with another DN that would prevent optimization. The terminating PBX must be allowed to originate a call to the originating PBX.
- Break-in is not allowed during route optimization, and route optimization is not allowed during a break-in. After break-in has ended for a call, route optimization may be applied to the call if it is eligible.

- Call Detail Recording (CDR) records are not printed at the originating or terminating PBX, during route optimization. CDR records are printed at tandem nodes when the non-optimum path is released. The CDR records contain the same information as if the call had occurred on the new path at the time that the original trunks were seized. The cost of the call (that is, the Periodic Pulse Metering information) that has been optimized is the sum of the cost before route optimization plus the cost after optimization. The originator of the original call is shown as the originator of the new call, at the originating PBX. The terminator of the call is shown as the terminator of the new call, at the terminating PBX. At transit PBXs, normal information is printed, showing original tandem connections being released as if for calls being cleared at the time of route optimization, and new tandem connections being released as if for calls being originated at the time of route optimization.

If an optimized call does not use any trunks, that is, the originating party and terminating party are on the same PBX, then CDR records show the call as being cleared as normal.

- A call that has been call-forwarded may be optimized upon being answered only if it has undergone alternative routing. If the forwarded call was not alternatively routed, it may have used a non-optimum path.
- A call that has been picked up or that has undergone hunting may be optimized upon being answered only if it has undergone alternative routing.
- A Ring Again new call may be optimized only if it has undergone alternative routing.
- A call transferred to another party may be optimized only after the call transfer has been completed. A call transferred to a ringing set may be optimized only after being answered.
- A call that has been rerouted due to Step Back on Congestion may be optimized after it is answered.
- During a group hunt, a call to a Pilot DN which has been defined as a trunk access code may be optimized upon being answered only if it has undergone alternative routing.
- A call which is camped-on or call-waiting to a set may not be optimized until the call is answered on the set

- Route optimization may be applied to a call that is being overridden only after it becomes a simple call.
- DPNSS1 calls in the ringing state are optimized immediately upon being answered. Transferred calls, on answer, are optimized as soon as the call transfer has been completed.
- Route optimization cannot be applied to the following calls:
 - data calls;
 - conference calls (however, route optimization may be applied when the conference call reverts to a normal two-party connection);
 - calls on hold;
 - attendant-originated calls.
- Single channel working is not supported on Meridian 1.
- If the conference tone is not switched off on the conference card, the parties involved in the call may hear conference tone during the optimization sequence.
- During a route optimization attempt, the originating PBX and terminating PBX do not initiate signaling for any other DPNSS1 supplementary service for the call.
- During a route optimization attempt, any key operation from a set involved in the call is ignored, except the release or onhook function. If a set not involved in a call is configured in a single call multiple appearance DN arrangement with a set involved in a route optimization attempt, then any key operation that interferes with the route optimization attempt is ignored. Therefore, the set is inhibited from joining the call during the route optimization attempt.
- After system initialization, conference calls are lost. Thus, route optimization may cause some established calls over non-optimum paths to be lost. Also, after system initialization, all route optimization requests are dropped at the PBX where the initialization has occurred. If the requesting party is not on this PBX, the requesting party is not informed that the request has been dropped.

- Pretranslation may be used with route optimization. The stored Call Reference Number (CRN) and the insert (INST) digits are pretranslated by the Initial Service Request Message (ISRM) before being sent, as if being pretranslated after been dialed by terminating party. Similarly, the Destination Address (DA) digits at the terminating PBX are pretranslated as if being dialed by the called party.
- Incoming Digit Conversion is not applied to the INST and CNR digits sent in the Route Optimization call set-up message. This interaction is intended to prevent the CNR digits from being corrupted by Incoming Digit Conversion.
- It is possible to configure Trunk Barring (TBAR) to prevent trunk-to-trunk connections on a local node. If a trunk call has tromboned over the network to another local trunk, the call will not be optimized if the TBAR configuration restricts the local connection.
- DPNSS operation and features are not supported over ISDN Basic Rate Interface (BRI) or BRI trunks.

Feature packaging

- DPNSS1 Network Services (DNWK) package 231

Dependencies:

- Digital Private Network Signaling System No. 1 (DPN) package 123;
- Integrated Digital Access (IDA) package 122, dependent on Digital Trunk Interface (PBXI) package 75, 2 Mbit Digital Trunk Interface (DTI2) package 129;
- International Supplementary Features (SUPP) package 131
- Basic Alternate Route Selection (BARS) package 57, dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Co-ordinated Dialing Plan (CDP) package 59, dependent on Dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Pretranslation (PXL) package 92
- Flexible Numbering Plan (FNP) package 160

Feature implementation

- **LD15-** In the Customer Data Block, configure the route optimization options.
- In response to the ROPT prompt, enter (NRO)/ROA/ROX/RAX, where NRO is used to inhibit route optimization, ROA is used to initiate route optimization for alternatively routed calls, ROX is used to initiate route optimization for calls which have been transferred or attendant-extended, and RAX is used to initiate route optimization for alternatively routed calls, or for calls which have been transferred or attendant-extended.

DPNSS1 Route Optimisation/MCDN Trunk Anti-Tromboning Interworking

The Digital Private Networking Signalling System No.1 (DPNSS1) Route Optimisation (RO)/Meridian Customer Defined Networking (MCDN) Trunk Anti-Tromboning (TAT) Interworking feature provides RO and TAT interworking at DPNSS1/MCDN gateway nodes.

Note: For detailed information on the DPNSS1 Route Optimisation feature, please refer to the *DPNSS1 Product Information Guide* and the *DPNSS1 Administration Guide*. For detailed information on the Trunk Anti-Tromboning feature, please refer to the *International ISDN PRI features description and administration* (for 2.0 Mbit applications), or the *ISDN Primary Rate Interface description and administration* (for 1.5 Mbit applications.)

RO/TAT interworking scenarios

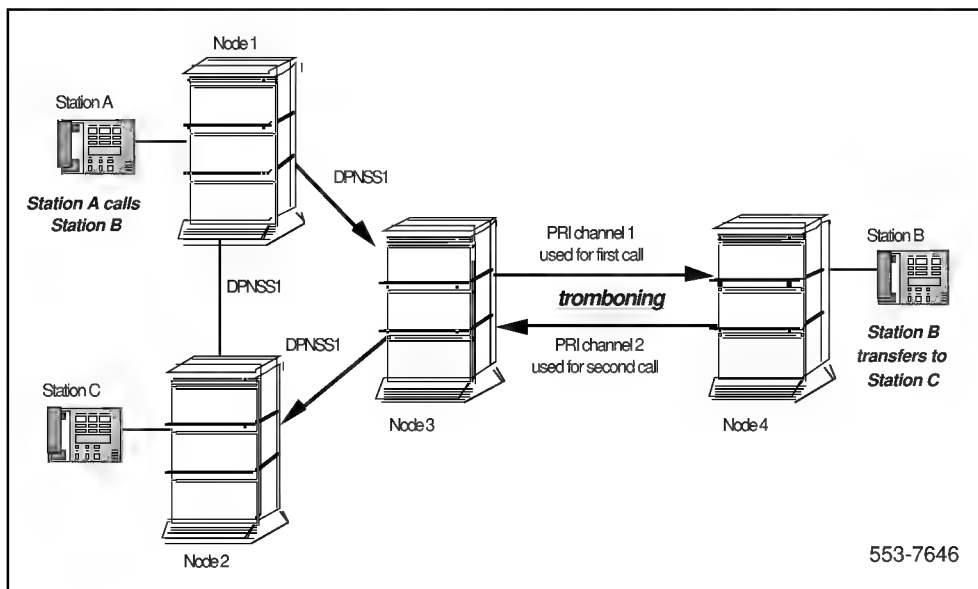
RO/TAT interworking within a DPNSS1 to MCDN gateway

The following example presents a case where RO/TAT interworking occurs within a DPNSS1 to MCDN gateway.

Note: In this example, we have used the case where a call has been redirected due to Network Call Transfer. The same functionality would apply if the call had been redirected by Network Call Forward No Answer, and Network Hunting, or modified by Network Call Transfer or Attendant Call Transfer.

Referring to Figure 60, Station A, located at Node 1 on the DPNSS1 side of the DPNSS1/MCDN gateway, calls Station B located at Node 4 on the MCDN side of the gateway. It is to be assumed that the optimum DPNSS1 route has been selected at the originating node (the case where a non-optimum route is selected is discussed in the note following Figure 61.) Station B activates Network Call Transfer to Station C, located at Node 2 on the DPNSS1 side of the gateway.

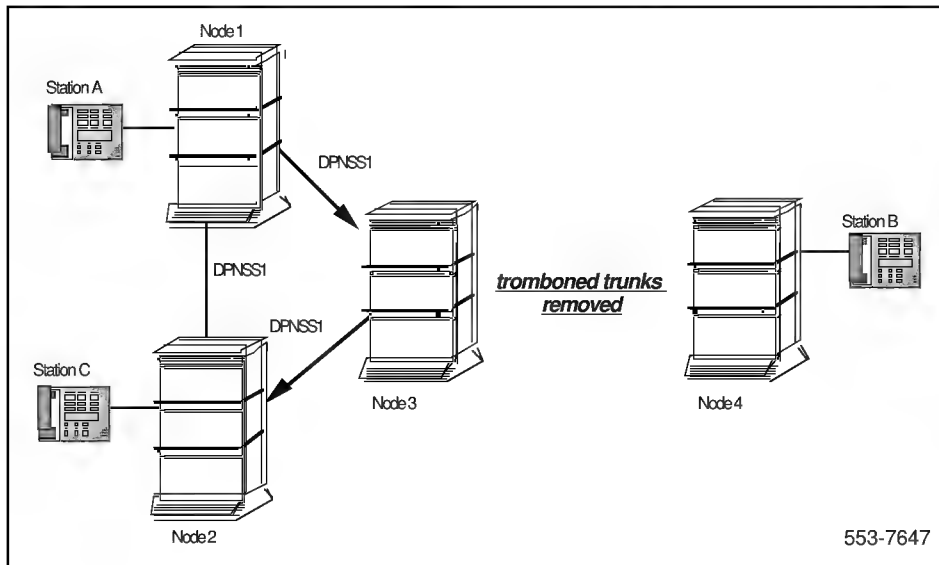
Upon activation, the existing call is put on hold and a new call is originated to Station C. Station C Answers. Station B completes the call transfer, leaving A connected to C using two DPNSS1 trunks and two PRI trunks.

Figure 60**DPNSS1/MCDN scenario with Network Call Transfer, before RO/TAT optimisation**

Note: The Network Call Transfer/Three Party Service gateway is not supported at the gateway Node 3. Therefore, RO is not initiated at Node 1, and the non-optimised DPNSS1 trunks remain connected.

On the MCDN side, TAT is initiated at Node 4. The call between A and C is bridged, and the redundant PRI trunks are removed between Node 4 and Node 3. For the meantime, the non-optimised DPNSS1 trunks remain connected, as shown in Figure 61.

Figure 61
DPNSS1/MCDN RO/TAT Interworking scenario, after TAT has been applied

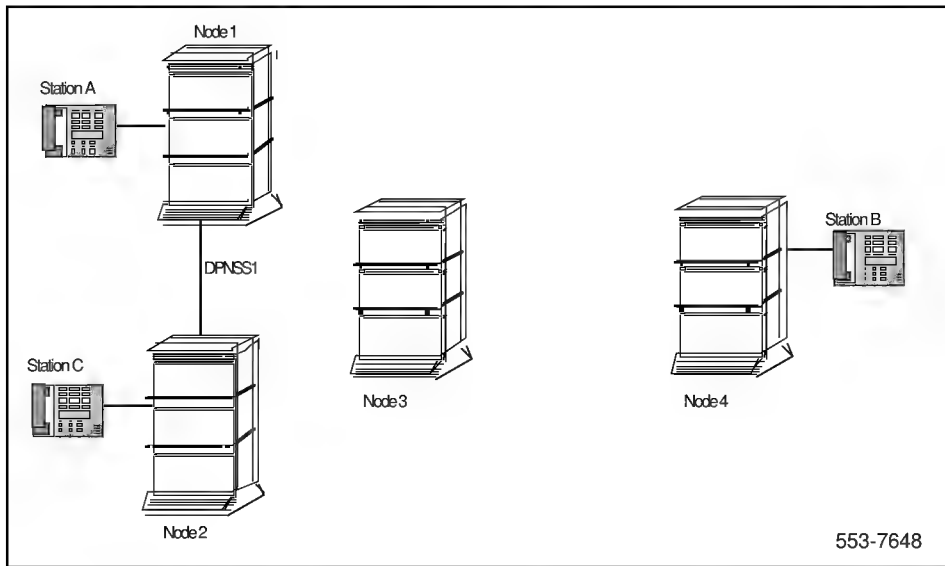


When TAT is completed on the MCDN side, The RO/TAT Interworking feature initiates RO on the DPNSS1 side by simulating a transfer at the gateway Node 3. The Three Party Service feature initiates signaling to update displays. Then, RO is initiated at Node 1, the originating node. The DPNSS1 trunks are dropped between Node 3 and 2 and Node 3 and Node 1, with Station A and Station C being connected over one DPNSS1 trunk. This is shown in Figure 62.

Note: If a non-optimum route is used at the originating node or at any transit node, Route Optimisation may start from Node 1 (the normal RO operation for the first call optimisation) or Node 3 (the normal RO operation for the second call optimisation), before TAT is completed. If TAT invocation is received on Node 3 while RO is being applied between Node 1 and Node 3 or Node 3 and Node 2, the completion of TAT is delayed until RO is totally finished.

Upon the completion of TAT on Node 3, a call transfer operation is simulated, and a new RO operation is initiated to remove any potential triangulation of routes.

Figure 62
DPNSS1/MCDN RO/TAT Interworking scenario, after RO has been applied



Note: If Station A is an attendant, TAT takes place on the MCDN side of the gateway but RO cannot take place on the DPNSS1 side. This is a RO limitation.

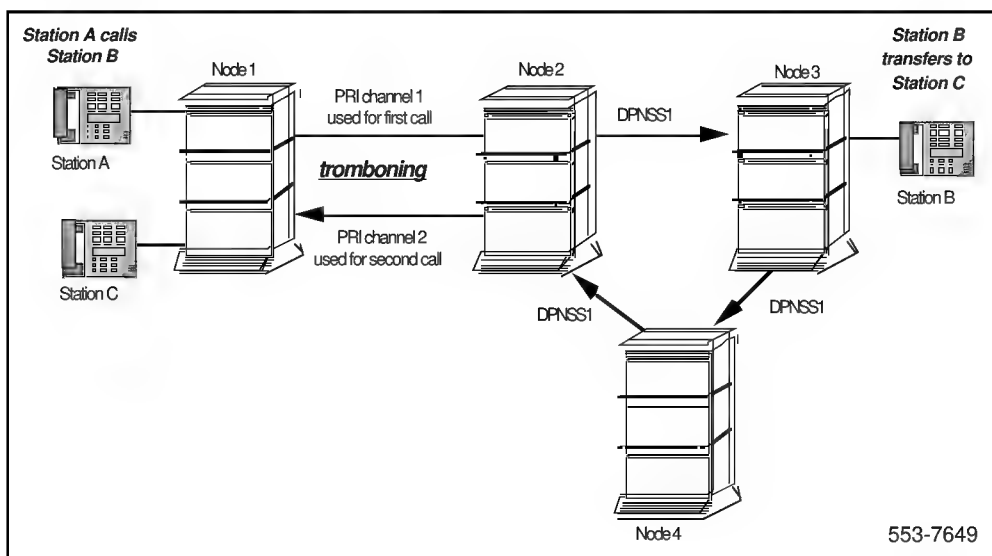
RO/TAT interworking within a DPNSS1 to MCDN gateway

The following example presents a case where RO/TAT interworking occurs within an MCDN to DPNSS1 gateway. Here, too, we are using the case of a call being transferred (using the DPNSS1 Three Party Service feature) across the gateway.

Referring to Figure 63, Station A, located at Node 1 on the MCDN side of the MCDN/DPNSS1 gateway, calls Station B located at Node 3 on the DPNSS1 side of the MCDN/DPNSS1 gateway. Station B transfers the call (using the Three Party Service feature) to Station C, also located at Node 1 on the MCDN side of the gateway.

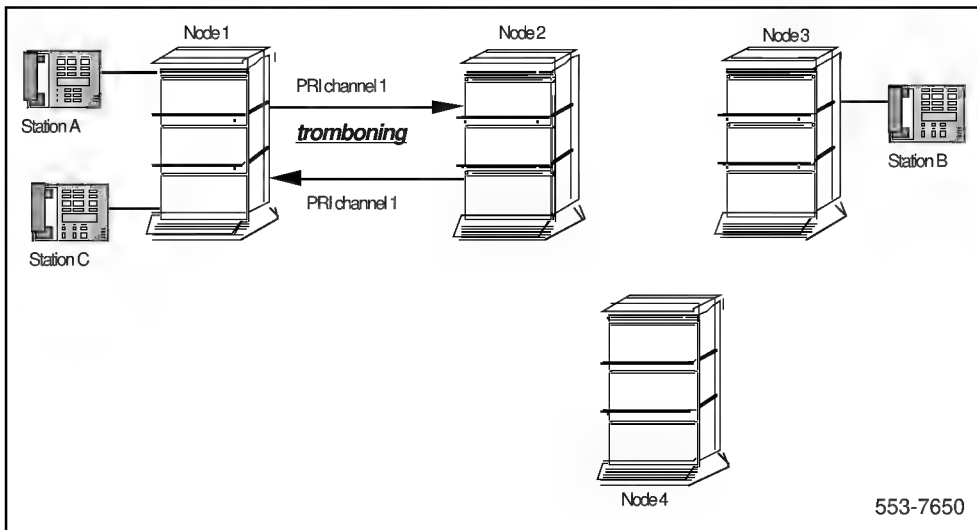
Upon activation, the existing call is put on hold and a new call is originated to Station C.

Station C Answers. Station B completes the call transfer, leaving A connected to C using three DPNSS1 trunks (in the example, the call is routed through Node 4) trunks and two PRI trunks.

Figure 63**MCDN/DPNSS1 RO/TAT Interworking scenario, before RO has been applied**

Once Three Party Service messaging has taken place, Node 2 initiates RO. The initial DPNSS1 routes are cleared. Node 2 becomes a MCDN/MCDN transit node, and the two tromboning PRI routes between Node 2 and Node 1 remain, as shown in Figure 64.

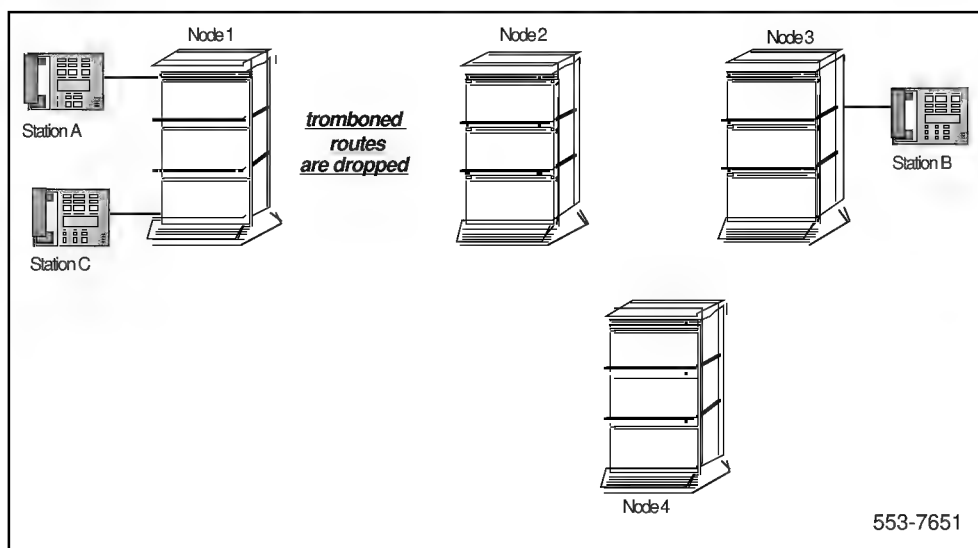
Figure 64
MCDN/DPNSS1 RO/TAT Interworking scenario, after RO has been applied



As soon as RO is completed, the RO/TAT initiates TAT at gateway Node 2. After TAT has been completed at Node 1, Node 2 simulates a transfer message to both Station A and Station C. This allows the Network Call Redirection feature to update the displays.

Note: If the originating and terminating nodes are one and the same, and if this node is not a tandem node, as is the case for Node 1 in our example, the displays are updated without the notification from the Network Call Redirection feature.

TAT is then completed. The redundant routes are cleared, and Station A and Station C are bridged, as shown in Figure 65.

Figure 65**MCDN/DPNSS1 RO/TAT Interworking scenario, after TAT has been applied**

Note 3: If Station A is an attendant, and the Network Attendant Service feature is configured, Station B cannot transfer to Station C, and no optimisation can take place. If NAS is not configured, Station B may transfer to Station C, and optimisation takes place as described in this example.

Note 4: In the case of call diversion on the DPNSS1 side (Diversion Immediate, Diversion on Busy, and Diversion on No Reply), there is no interaction with the RO/TAT Interworking feature (the interaction occurs between the Diversion and TAT features.) In the case of tromboning on the DPNSS1 side, the Diversion feature clears the DPNSS1 tromboning trunks before Station C answers the call. When C answers, TAT is applied transparently.

Note 5: Node 1 cannot be a DMS switch for the RO/TAT Interworking feature to operate.

RO/TAT interworking within multiple MCDN/DPNSS1 gateways

A RO/TAT Interworking is supported within a multiple gateway scenario, as illustrated by the following example. Referring to Figure 66, Station A on the originating node call Station B across the multiple gateway scenario over PRI and DPNSS1 trunks, as shown below. Station B then transfers to Station C, over different PRI/DPNSS1 trunks. When Station C has completed the call transfer, and Station C answers, TAT is first activated at the far end node, removing the two end PRI trunks. The RO/TAT Interworking feature then activates RO on the DPNSS1 portion of the gateway, removing the DPNSS1 trunks. Then, TAT is activated to remove the last two PRI trunks at the near end of the gateway, leaving Station C and Station A bridged, as shown in Figure 67.

Figure 66
RO/TAT Interworking within multiple DPNSS1/MCDN gateways, before RO/TAT

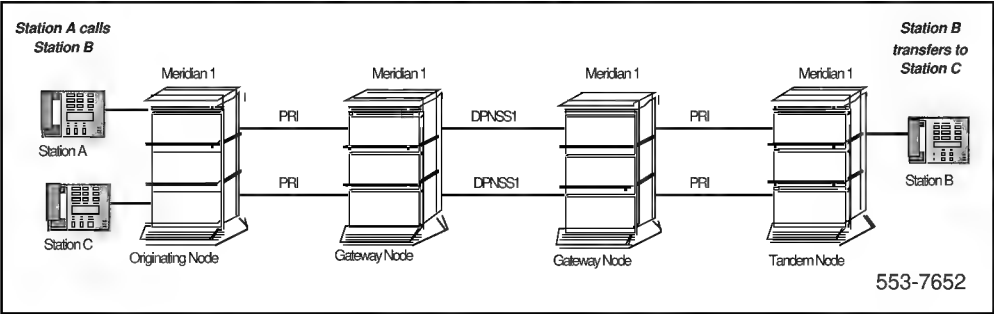
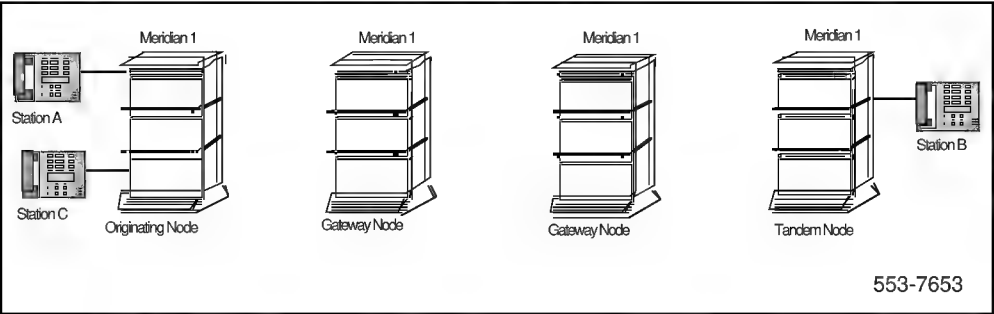


Figure 67
RO/TAT Interworking within multiple DPNSS1/MCDN gateways, after RO/TAT



Abnormal RO/TAT interworking scenarios

The following are possible scenarios whereby the RO/TAT Interworking feature may function abnormally.

- RO fails or is not configured, and TAT is configured.

In the case of a DPNSS1/MCDN gateway, TAT optimises the PRI trunks on the MCDN side, but the DPNSS1 trunks are not optimised on the DPNSS1 side.

In the case of an MCDN/DPNSS1 gateway, RO is not activated and the DPNSS1 side is not optimised. Since the DPNSS1 trunks remain, TAT is not invoked at the gateway node, even though it is equipped. Therefore, if RO is not activated, the RO/TAT Interworking functionality is not invoked.

- TAT fails or is not configured, and RO is configured.

In the case of an MCDN/DPNSS1 gateway, RO optimises the DPNSS1 trunks on the DPNSS1 side, but the MCDN trunks are not optimised on the MCDN side.

In the case of a DPNSS1/MCDN gateway, TAT is not activated on the MCDN side and the tromboning PRI trunks remain. Since the PRI trunks remain, RO is not invoked at the gateway node, even though it is equipped, and DPNSS1 trunks are not optimised on the DPNSS1 side. Therefore, if TAT is not activated, the RO/TAT Interworking functionality is not invoked.

Operating parameters

Although Trunk Anti-Tromboning functions between a Meridian 1 switch and a DMS switch, no TAT messaging is initiated to a DMS switch after Route Optimisation is activated on the DPNSS1 side of an ISDN MCDN/DPNSS1 gateway.

As explained in “Abnormal RO/TAT interworking scenarios” on page 659, both RO and TAT must be activated in order for the RO/TAT Interworking functionality to operate.

The RO/TAT Interworking functionality is only activated after call connection.

RO/TAT Interworking functionality is not applied if the originating party of the first call or the terminating party of the second call is on a conference call.

RO/TAT Interworking functionality is not applied if the originating party of the first call is an attendant.

RO/TAT Interworking functionality is not applied to data calls.

Route Optimisation may be applied to any portion of a DPNSS1 network, as long as both the originating node and terminating nodes are equipped with the RO feature. This is because optimisation is performed by initializing a new call between the originating node and terminating node. However, for the same to apply to Trunk Anti-Tromboning within an MCDN network, every exchange along the network must be equipped with the TAT feature. This is because TAT releases trunks step by step.

Multiple hops across a gateway are supported separately by RO and TAT.

Feature interactions

Multiple Hops

Multiple hops are supported within every RO/TAT Interworking gateway scenario, since they are supported separately by RO and TAT.

Network Attendant Service

If tromboning trunks are removed on the MCDN side of a RO/TAT Interworking gateway scenario by the Network Attendant Service feature (since NAS has precedence over TAT), the RO/TAT Interworking functionality is not invoked. The result is that, if NAS is equipped, attendant-extended calls that are in a tromboning state are optimised on the MCDN side, but DPNSS1 trunks are not optimised on the DPNSS1 side of the RO/TAT Interworking gateway scenario.

Network Call Pickup

If tromboning trunks are removed on the MCDN side of a gateway scenario by the Network Call Pickup feature (since Network Call Pickup has precedence over TAT), TAT is invoked since the Network Call Pickup action is considered as a call forward action. RO/TAT functionality is invoked upon completion of the TAT operation.

Network Call Redirection

If Network Call Redirection is not configured in an DPNSS1/MCDN gateway, the displays are updated normally, since the RO/TAT Interworking feature is not affected.

If Network Call Redirection is not configured in an MCDN/DPNSS1 gateway, the displays are not updated on the bridged sets on the MCDN side. However, if the bridged sets are on the same node, the displays are updated even though NCRD is not configured.

Three Party Service

DPNSS1 Three Party Service is required for every RO/TAT Interworking scenario.

Trunk Route Optimization before Answer

There is no interaction between the Trunk Route Optimization before Answer feature and the RO/TAT Interworking feature, since Trunk Route Optimization before Answer is activated before call completion, and the RO/TAT Interworking functionality is only activated after call connection.

Virtual Network Services

The RO/TAT Interworking feature is not supported over VNS trunks, since VNS uses only MCDN signaling (DPNSS1 is not supported.)

Feature packaging

For the software packages required to support the DPNSS1 Route Optimisation/MCDN Trunk Anti-Tromboning Interworking feature, consult the following publications:

- For DPNSS1 network functionality:
 - *DPNSS1 Product Information Guide* 553-3921-100;
- For MCDN Network Attendant Service interworking:
 - *International ISDN PRI features description and administration* 553-2901-301

Feature administration

No new steps are required to configure the DPNSS1 Route Optimisation/MCDN Trunk Anti-Tromboning Interworking feature. However, the following basic configuration must be done:

- Configure MCDN Trunk Anti-Tromboning at the far-end switch, in LD 17 (TAT is configured on a D-Channel basis, and not on a route basis). Refer to the *International ISDN PRI features description and administration* 553-2901-301
- Configure DPNSS1 Route Optimisation options, in LD 15. Refer to *DPNSS1 Administration Guide*.
- Configure call display transfer indication for DPNSS1 Three-Party Service, in LD 95. Refer to *DPNSS1 Administration Guide*.
- Optionally (to update terminal displays), configure Network Call Redirection, using LD 15, LD 16, LD 95, LD 10, and LD 11. Refer to the *International ISDN PRI features description and administration* 553-2901-301

Feature Operation

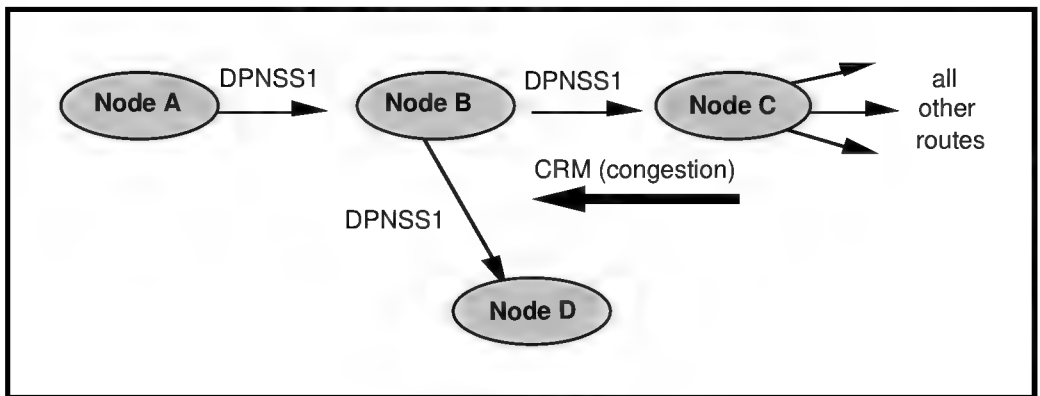
There are no operating procedures specified for this feature.

DPNSS1 Step Back on Congestion

This feature has been developed to handle high traffic situations, when DPNSS1 calls may encounter congestion. If a call over a DPNSS1 network is blocked due to congestion, a Clear Request Message (CRM) is sent back to the preceding node. A transit node or a DPNSS1/ISDN gateway node may receive a CRM with a clearing cause of congestion. An originating node may receive either a CRM containing a clearing cause of congestion, or a CRM containing a clearing cause of Network Termination and a Loop Avoidance Supplementary string. Depending on the SBOC option configured in overlay 86, the Electronic Switched Network overlay, the call may be passed back or re-routed using the next free alternative route.

If a CRM with a clearing cause of congestion is received at a transit node, the call may be passed back or re-routed. If a CRM of congestion is received at a DPNSS1/ISDN gateway node, the ISDN Drop Back Busy options, included in the SETUP message according to the Route List Block, are checked to determine whether the call is to be dropped back. If not, the DPNSS1 Step Back on Congestion feature is invoked. If an originating node receives either a CRM containing a clearing cause of congestion, or a CRM containing a clearing cause of Network Termination and a Loop Avoidance Supplementary string. The call may be routed using the next free alternative route, or receive call blocking treatment if no re-routing is configured or if no alternative route is available.

Transit node operation



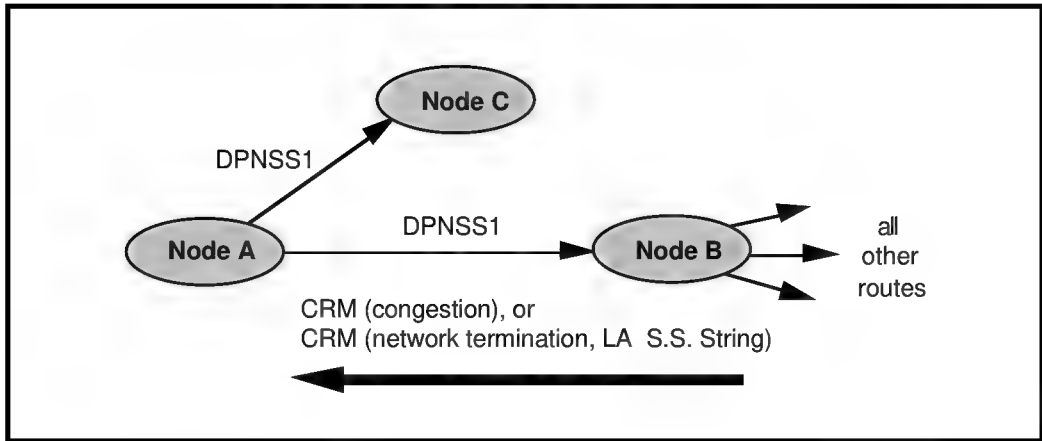
An attempt is being made to establish a call through a DPNSS1 network, from originating node A to terminating node C, via transit node B. All the trunks at node C are busy, so that a CRM with a clearing cause of congestion is sent to the preceding node (node B). At transit node B, alternative 1 is to re-route to node C, and alternative 2 is to re-route to node D.

The SBOC option for node B is checked in overlay 86 to determine the treatment. If SBOC = RRA, the next free alternative is tried. If the Class of Service and Network Class of Service access checks are passed, the call is re-routed to the next free alternative, which is node D. A Network Indication Message indicating alternative routing is sent to the preceding node (node A). If there had been no free alternatives, a CRM of congestion would have been sent back to node A.

If SBOC = NRR or RRO, a CRM of congestion is passed back from transit node B to the preceding node A.

Note: If the call is a route optimization attempt, there is no attempt made to re-route it — a CRM of congestion is passed back to the preceding node.

Originating node operation



An attempt is being made to establish a call through a DPNSS1 network, from originating node A to terminating node B. All the trunks at node B are busy, so that a CRM with a clearing cause of congestion, or a CRM containing a clearing cause of Network Termination and a Loop Avoidance Supplementary string, is sent to the preceding node (node A).

The SBOC option for node A is checked in overlay 86 to determine the treatment. If SBOC = RRA or RRO, the next free alternative (node C) is tried.

If SBOC = NRR, or if no alternatives are available, the network blocking treatment, as defined by prompt NBLK in overlay 15, is applied to the call at node A. Note that, for local extensions, if the dialing has not been completed, the provision of busy tone treatment (if defined) is delayed so that digits may be dialed for other features such as Ring Again.

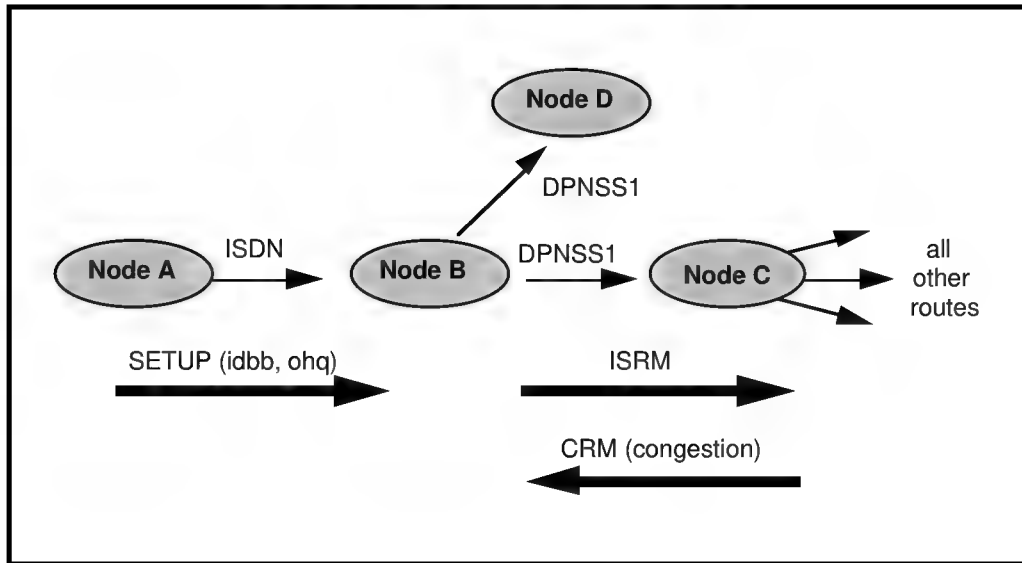
Operating parameters

- This feature uses the ESN Coordinated Dialing Plan, or Network Alternate Route Selection (NARS) or Basic Alternate Route Selection (BARS) to re-route a congested call. Re-routing is not attempted if a trunk access code was used to originate the call.

Feature interactions

- If a call that has undergone digit manipulation encounters congestion, digit manipulation is re-applied using the originally dialed digits before re-routing is attempted.
- A call that is blocked due to the DPNSS1 Loop Avoidance feature may be re-routed at the originating node, but not at a transit node.
- DPNSS1 route optimized calls that encounter congestion are not re-routed, since route optimization only uses first choice routes.
- The intercept treatment applied due to network blocking is customer-defined in overlay 15.
- DPNSS1/ISDN gateway interworking may be illustrated as follows:

ISDN-to-DPNSS1 gateway node operation



An attempt is being made to establish a call through an ISDN-to-DPNSS1 gateway, from originating node A to terminating node C, via gateway node B. When a gateway node (node B) receives a SETUP message, the IDBB and OHQ options are stored. The IDBB option is used to determine which route sets can be used for ISDN Drop Back Busy, and the OHQ option is used to decide if Off Hook Queuing is to be applied at the congested node.

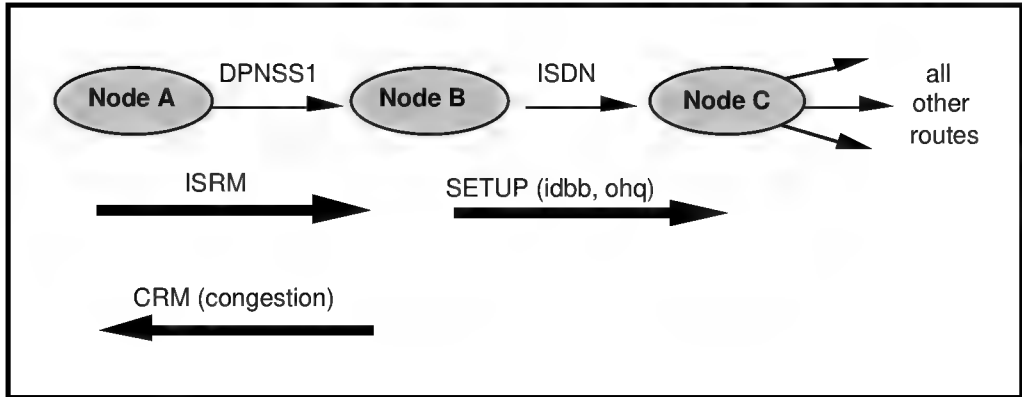
If all the trunks at node C are busy, a CRM with a clearing cause of congestion is sent to the gateway node (node B). At node B, the decision is made whether to apply Drop Back Busy or Off Hook Queuing. If OHQ = NO, the call is dropped back to the originating node — the SBOC option is not checked.

If OHQ = YES, treatment is applied according to the SBOC option. If SBOC = RRA, an attempt is made to find a free alternative route, as defined by the IDBB option (if IDBB = DBI, then only I-SET routes may be used to route the call; if IDBB = DBA, then all E-SET routes may be used to route the call). If a free alternative route is found, the call is routed to node D. If no free alternative route is found, the call is dropped back

to node A. If SBOC = RRO or NRR, node B drops the call back to node A by sending a DISCONNECT message with a cause of normal clear.

The following illustrations depict the DPNSS1 Step Back on Congestion functionality as applied to a call trying to be established through a DPNSS1 network at the originating node, at a transit node, at an ISDN-to-DPNSS1 gateway, and at a DPNSS1-to-ISDN gateway.

DPNSS1-to-ISDN gateway node operation



An attempt is being made to establish a call through an DPNSS1-to-ISDN gateway, from originating node A to terminating node C, via gateway node B. In order to provide a consistent interworking between ISDN Drop Back Busy and DPNSS1 Step Back on Congestion, the options for IDBB and OHQ are included at gateway node B in the SETUP message from the outgoing route list block. If all the trunks at node C are busy, and drop back occurs, a DISCONNECT message with a cause of normal clear is sent to gateway node B, where it is recognized as a drop back attempt. The DISCONNECT message is mapped to a CRM with a reason of congestion, so that Step Back on Congestion is invoked in the DPNSS1 segment of the path.

— DPNSS1 operation will not support the following:

- ISDN Basic Rate Interface (BRI) sets
- or
- ISDN BRI Numeris Terminals.

Feature packaging

— DPNSS1 Network Services (DNWK) package 231

Dependencies:

- Integrated Digital Access (IDA) package 122
- Digital Private Network Signaling System No. 1 (DPN) package 123
- International Supplementary Features (SUPP) package 131
- Basic Alternate Route Selection (BARS) package 57, dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Co-ordinated Dialing Plan (CDP) package 59, dependent on Basic Routing (BRTE) package 14 and Network Class of Service (NCOS) package 32
- Pretranslation (PXLT) package 92
- Flexible Numbering Plan (FNP) package 160
- At gateway and ISDN nodes, the Network Attendant Service (NAS) package 159
- For the ISDN Drop Back Busy feature, the Originating Routing Control/Remote Virtual Queuing (ORC-RVQ) package 192, the Network Alternate Route Selection (NARS) package 58, the Network Class of Service (NCOS) package 32, the Basic Routing (BRTE) package 14, the Flexible Call Back Queuing (FCBQ) package 61, and Integrated Services Digital Access (ISDN) package 145.
- For ISDN signaling links, the Primary Rate Access (PRA) package 146

Feature implementation

- **LD86-** In the ESN overlay, define the step back or re-routing options for calls encountering congestion.
 - In response to the SBOC prompt, enter NRR for no re-routing of calls, enter RRO to re-route calls if at an originating node, or to step back if at a transit node, or enter RRA to re-route calls if at all nodes.
 - In response to the IDBB prompt, enter (DBA)/DBI to define the alternative route sets for ISDN Drop Back Busy. DBA = all E-SET routes may be used to route calls, DBI = only I-SET routes may be used to route calls.
- **LD15-** In the Customer Data Block overlay, define the network blocking treatment for calls stepped back to the originating node.
 - In response to the NBLK prompt, enter four of the following treatments: OVF, ATN, RAN, BSY, SRC1.SRC8. The default is OVF, OVF, OVF, ATN.

DPNSS1/DASS2 Uniform Dialling Plan Interworking

The Digital Private Network Signaling System (DPNSS1)/Digital Access Signaling System (DASS2) Uniform Dialling Plan (UDP) Interworking feature enables DPNSS1 to use Uniform Dialling Plan numbering. The feature allows DPNSS1 calls to be routed from a switch in one geographical location to another switch in any other geographical location in a cost-effective and easy-to-use manner via the Network Alternate Route Selection (NARS) and Basic Alternate Route Selection (BARS) features.

The following NARS/BARS functions are supported by this development:

- On-network routing over DPNSS1 using a standardized dialling format (Access Code (AC) - Location Code (LOC) - destination DN).
- Off-network routing and break-outs to supported public network interfaces.
- Incoming DASS2 calls routed through the UDP DPNSS1 with NARS if the received digits are in the format AC - LOC or AC-SPN Special Number (SPN) - X...X, or if an Incoming Digit Conversion (IDC) table is applied to generate a number in such a format. In this case, all NARS functionalities supported on DPNSS1 apply to the incoming DASS2 call.

- Least cost route selection by arranging the routes based on relative cost.
- Route control allowing or restricting access to routes based on their restriction level, the time of day, or the dialed sequence.
- Simple calls using UDP numbering across the DPNSS1 Meridian Customer Defined Network (MCDN) gateway, operating with either enbloc or overlap sending and receiving.
- The following DPNSS1 Supplementary Services are supported on UDP DPNSS1 and across the DPNSS1 MCDN gateway:
 - Call Back When Free
 - Call Back When Next Used
 - Executive Intrusion
 - Loop Avoidance
- The following DPNSS1 Supplementary Services are supported on UDP DPNSS1
 - Three-Party
 - Call Offer
 - Redirection
 - Step Back on Congestion
 - Route Optimisation

With DPNSS1, no parameters are exchanged between the switches to indicate whether a Coordinated Dialing Plan (CDP) or UDP number is being sent. To bypass this situation, the MCDN Insert Access Code (INAC) prompt is extended to DPNSS1 on a per route basis to indicate whether the route is dedicated for the reception of UDP numbers, or non-UDP numbers and UDP numbers with a NARS access code.

Operating parameters

The BARS feature by itself (i.e., without NARS) is not supported.

If INAC = YES, an incoming DPNSS1 route only supports UDP numbers with or without the NARS Access Code. If INAC = NO, both non-UDP and UDP numbers are supported providing UDP numbers are appended with the local NARS Access Code.

All HLOCs, LOCs and SPNs NARS codes for a customer must be leftwise unique.

At an originating node, the Traveling Class of Service (TCOS) is not transmitted over DPNSS1. At a receiving node, the Network Class of Service's Facility Restriction Level of the incoming trunk group is used for any further check on access restrictions.

Any number made up of a Route Access Code followed by a DN, received on a route configured with the INAC prompt set to YES, is blocked.

CBWF/CBWN, Loop Avoidance, Three-Party, Call Offer, Redirection, Step Back on Congestion, Route Optimisation, and Executive Intrusion are the only supported Supplementary Services on a DPNSS1 UDP.

The following hardware is required (minimum vintage):

- DASS2/DPNSS1 D-channel Interface Handler
 - Standard Mode (0-15 D-channels) – NT5K35AA
 - Expanded Mode (0-159 D-channels) – NT5K75AA
- 2 Mbps Primary Rate Interface Card – NT8D72AA
- PRI card for MCDN/DPNSS1 – NT6D11AE
- Network Interface Card – QPC414
- Clock Controller Card – QPC775D
- D-channel Handler (for the Option 11).

Feature interactions

Access Restrictions

The connection between the network user (extension or trunk) and the DPNSS1 UDP trunk can be barred based on the Class of Service Restrictions of the parties involved. The connection between the network user (extension or trunk) and the DPNSS1 trunk can also be barred based on the Trunk Group Access Restrictions feature. It is possible to bar the connection between originator and terminator through a DPNSS1 UDP trunk based on the DPNSS1 signaling information.

The Code Restriction sub-feature is not supported.

Attendant Alternate Answering

If an incoming DPNSS1 UDP call presented to an idle loop key of an attendant is not answered within a predefined period of time, the call can be rerouted to the Attendant Alternate DN.

Attendant Interpositional Transfer

This feature is supported in a UDP DPNSS1 network. An attendant can call or transfer a call to another attendant in a multiple-console group, even when the destination Attendant Console is busy.

Attendant Overflow Position

This feature is supported on a UDP DPNSS1 network. If an incoming DPNSS1 UDP call is queued to the attendant, and if the call is not answered within a predefined period of time, the call can be redirected to the Attendant Overflow DN.

Automatic Call Distribution (ACD)

This feature is supported; however, when a call is answered by an agent through a DPNSS1 UDP route, the display on the originator's set is not updated when the ACD agent answers the call.

Call Detail Recording

This feature is supported in a DPNSS1 UDP network. The following items should be noted:

- If an expensive route (EXP prompt in the Route List Index block) is used to route the call, and if the calling party is allowed the expensive route warning tone (RWTA prompt in Network Control block), the Digit Type Identifier field is “E” in the call record output; otherwise it is “A”.
- If both NARS and BARS packages are equipped in a DPNSS1 UDP network, the Digits field in the call record follows the BARS format. If the Outpulsed Digits feature is used, and OPD = NO, the Route Access Code (ACOD) + the digits dialed after the NARS/BARS Access Code are displayed in the call output record. If the Outpulsed Digits feature is used, and OPD = YES, the Route Access Code + the outpulsed digits are displayed in the call output record.

Call Forward

Calls can be forwarded to and from a DPNSS1 UDP network.

Call Party Name Display

This feature is supported in a DPNSS1 UDP network. Names can be associated with the access codes of the DPNSS1 UDP routes defined in LD 95.

Call Pickup

This feature is supported in a DPNSS1 UDP network.

Custom Call Routing

This feature is not supported in a DPNSS1 UDP network.

Digit Display

The digit display rules for DPNSS1 UDP are based on what is currently done on an MCDN network.

Direct Inward Dialing

This feature is supported in a DPNSS1 UDP network. A connection between a DASS2 DID trunk and a DPNSS1 UDP trunk can be barred using the DITI option in the Customer Data Block.

Direct Inward System Access

This feature is not supported.

DPNSS1 Gateway

The supplementary services supported in a DPNSS1 UDP network are Call Back When Free/Call Back When Next Used, Loop Avoidance, Three-Party, Call Offer, Redirection, and Executive Intrusion.

Electronic Switched Network (ESN)

The DPNSS1/DASS2 Uniform Dialing Plan Interworking feature is a form of ESN routing. The following list describes which ESN functionalities are applicable to a DPNSS1 UDP network.

Alternative Routing for DID/DOD

This feature is supported in a DPNSS1 UDP network.

Basic Alternate Route Selection

The BARS feature alone is not supported.

Coordinated Dialing Plan

Non-UDP and UDP numbers, if they are appended with the NARS access code, received on a route configured with INAC set to NO are now able to terminate, transit, or be sent across the gateway if they are valid.

ESN Signaling (Network Signaling)

The Network Signaling feature is incompatible with DPNSS1 routes.

Eleven Digit Translation

This feature is supported in a DPNSS1 UDP network. Numbers received on an incoming UDP DPNSS1 route can be translated with the existing NARS translator up to 11 digits for route selection.

Flexible Call Back Queuing

This feature is incompatible with DPNSS1 routes.

Flexible ESN 0 Routing

This feature is not supported in a DPNSS1 UDP network.

Flexible Numbering Plan

This feature is supported in a DPNSS1 UDP network.

Free Calling Area Screening**Free Special Number Screening**

These features are not supported in a DPNSS1 UDP network.

Incoming Trunk Group Exclusion

This feature is supported in a DPNSS1 UDP network.

Multiple DID Office Code Screening

This feature is not supported in a DPNSS1 UDP network.

NARS Traffic Measurement (Network Traffic Measurement)

This feature is supported in a DPNSS1 UDP network in the following areas:

- Routing Traffic Measurements – provides data related to route list utilization, and
- NCOS Measurements – provides data about the quality of service for a defined NCOS group.

Network Authorization Code

This feature is supported in a DPNSS1 UDP network.

Network Control

This feature is supported in a DPNSS1 UDP network.

Network Routing Control

This feature is supported in a DPNSS1 UDP network.

Network Speed Call

This feature is supported in a DPNSS1 UDP network.

Network Call Transfer

This feature is not applicable to a DPNSS1 UDP network, as it only applies to analog trunks.

Network Queuing (Call Back Queuing)

This feature is incompatible with DPNSS1 routes.

Off-Hook Queuing

This feature is not supported in a DPNSS1 UDP network.

Off-Network Number Recognition

This feature is supported in a DPNSS1 UDP network.

Priority Queuing

This feature is incompatible with DPNSS1 routes.

Satellite Link Control

This feature is not supported in a DPNSS1 UDP network.

Special Common Carrier Access

This feature is not supported in a DPNSS1 UDP network.

Tone Detection

This feature is not supported in a DPNSS1 UDP network.

1+ Dialing

This feature is not supported in a DPNSS1 UDP network.

Group Hunting

Only basic DPNSS1 UDP calls are supported with group hunting.
Interactions between DPNSS1 Supplementary Services and Group Hunting are not supported.

Incoming DID Digit Conversion (IDC)

An IDC table can be used to convert digits received on a DASS2 DID trunk into a digit string having the UDP format. This allows a DASS2 DID call to access the DPNSS1 UDP network.

Intercept

The NARS blocking treatments that can be defined through the Intercept feature are applicable to a DPNSS1 UDP network.

Intercept Computer

This feature is not supported in a DPNSS1 UDP network.

Interchangeable NPA/NXX

This feature is not supported in a DPNSS1 UDP network.

Meridian Link

This feature is not supported in a DPNSS1-UDP network.

Meridian Mail

This feature is not supported in a DPNSS1 network.

Meridian Mail, Standalone

This feature is supported in a DPNSS1 UDP network.

Network Message Services

This feature is not supported in a DPNSS1 UDP network.

New Flexible Code Restrictions (NFCR)

Toll-denied users (CLS = TLD) may be subject to NFCR if they make a NARS call across the DPNSS1 UDP network. This feature is supported in a DPNSS1 UDP network.

Overlap Signaling

This feature is supported in a DPNSS1 UDP network.

Pretranslation

This feature is supported in a DPNSS1 UDP network.

Recorded Announcement for Calls Diverted to External Trunks

This feature is not supported in a DPNSS1 UDP network.

Route Optimisation

This DPNSS1 feature is supported.

R2MFC to DPNSS1 Gateway

This gateway is supported with UDP numbers at the same level as it is supported with CDP numbers.

Special Dial Tone after Dialed Numbers

This feature is supported in a DPNSS1 UDP network.

Feature packaging

The DPNSS1/DASS2 Uniform Dialing Plan Interworking feature is part of basic X11 system software. The following package is required:

- Network Alternate Route Selection (NARS) package 58.

Basic Alternate Route Selection (BARS) package 57 may also be equipped.

For on-net and off-net routing capabilities, the following package is required:

- Flexible Numbering Plan (FNP) package 160.

If more ESN functions are desired the following packages are required:

- Network Traffic Measurement (NTRF) package 29
- Network Authorization Code (NAUT) package 63
- Basic Authorization Code (BAUT) package 25
- System Speed Call (SSC) package 34
- Network Speed Call (NSCL) package 39, and
- Directory Number Expansion (DNXP) package 150.

If a Group Dialing Plan is to be used, the following package is required:

- Coordinated Dialing Plan (CDP) package 59.

If displays are required, the following package must be equipped:

- Digit Display (DDSP) package 19.

The following packages are required for DASS2/DPNSS1:

- Integrated Digital Access (IDA) package 122
- Digital Private Network Signaling System 1 (DPNSS) package 123
- Digital Access Signaling System 2 (DASS2) package 124, and
- International Supplementary Features (SUPP) package 131.
- 2.0 Mbps Primary Rate Interface (PRI2) package 154 is a prerequisite.

Feature implementation

LD 87 – Define the NCOS groups to which the users will belong.

Prompt	Response	Description
REQ	NEW	New.
CUST	0-31	Customer Number.
FEAT	NTCL	Network Control Block.
NCOS	0-31	Network Class of Service.
FRL	0-7	Facility Restriction Level.
RWTA	(NO), YES	Expensive Route Warning Tone.

LD 86 – Define the NARS feature parameters (all prompts of the ESN Block are applicable to a DPNSS1 UDP network).

Prompt	Response	Description
REQ	NEW	New.
CUST	0-31	Customer Number.
FEAT	ESN	Electronic Switched Network Block.
...		
AC1	xx	NARS Access Code 1 (1-4 digits if Flexible Numbering Plan (FNP) package 160 is equipped; otherwise 1-2 digits).
AC2	xx	NARS Access Code 2 (1-4 digits if Flexible Numbering Plan (FNP) package 160 is equipped; otherwise 1-2 digits).

LD 86 – Define the Digit Manipulation tables.

Prompt	Response	Description
REQ	NEW	New.
CUST	0-31	Customer Number.
FEAT	DGT	Digit Manipulation Table.
DMI	x...x	Digit Manipulation Table Index.

LD 86 – Define the Route List blocks.

Prompt	Response	Description
REQ	NEW	New.
CUST	0-31	Customer Number.
FEAT	RLB	Route List Block.
RLI	x...x	Route List Index number.
ENTR	0-63	Entry number.
- ROUT	0-511	Route number associated with the index.
...		
- OHQ	NO	On-Hook Queuing is not supported in a DPNSS1 UDP network (ROUT is a DPNSS1 route).
- CBQ	NO	Call Back Queuing is not supported in a DPNSS1 UDP network (ROUT is a DPNSS1 route).

LD 90 – Define the NARS LOC translation table.

Prompt	Response	Description
REQ	NEW	New.
CUST	0-31	Customer Number.
FEAT	NET	Network Translation Table.
TRAN	AC1	NARS Access Code 1 (1-4 digits if Flexible Numbering Plan (FNP) package 160 is equipped; otherwise 1-2 digits).
TYPE	LOC	Location Code.
LOC	x...x	Location Code (3-7 digits).
FLEN	(0)-10	Flexible number of digits for Location Code (prompted if Flexible Numbering Plan (FNP) package 160 is equipped).
RLI	x...x	Route Line Index.

LD 90 – Define the NARS HLOC translation table.

Prompt	Response	Description
REQ	NEW	New.
CUST	0-31	Customer Number.
FEAT	NET	Network Translation Table.
TRAN	AC1	NARS Access Code 1 (1-4 digits if Flexible Numbering Plan (FNP) package 160 is equipped; otherwise 1-2 digits).
TYPE	HLOC	Home Location Code.
LOC	x...x	Home Location Code (3-7 digits).
DMI	x...x	Digit Manipulation Table Index.

LD 16 – Select the DPNSS1 UDP routes.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	RDB	Route Data Block.
...		
TKTP	IDA	Integrated Digital Access.
SIGL	DPN	DPNSS1 signaling on this route.
...		
RCLS	...	
- INAC	YES	DPNSS1 route supporting only UDP numbers.
- SPN	(YES), NO	Insert first the LOC's Access Code to search for a valid UDP number.

LD 15 – Configure the HLOC in the Customer Data Block to use the UDP digit format on DPNSS1 UDP routes.

Prompt	Response	Description
REQ	CHG	Change.
TYPE	CDB NET_DATA	Customer Data Block. Release 21 gate opener.
...		
HLOC	100-3199	Home Location Code (the HLOC entered here should be the same as that defined in the NET block).

LD 90 – Define SPN numbers.

Prompt	Response	Description
REQ	NEW, CHG, OUT	Create, change, or remove data.
CUST	0-31	Customer Number.
FEAT	NET	Network Translation Tables.
TRAN	AC1, AC2, SUM	Access Code 1, 2, or summary tables.
TYPE	SPN	Special Number translation code.
SPN	xxxx xxxx x..	Special Number translation.
RLI	0-319	Route List Index.
SDRR	aaa	Type of supplemental restriction or recognition.
DENY	x...x	A number to be denied within the SPN. The maximum number of digits allowed is 10 minus n, where n is the number of digits entered for the prompt SPN. Repeat to deny other numbers.
ARRN	xxxxx	Alternate Routing Remote Number.
ARLI	0-319, <CR>	Only output if ARRN is output.
LDID	x...x	Local DID number recognized with the NPA, NXX, or SPN.
DMI	1-255	Digit Manipulation Table Index.
LDDD	x...x	Local DDD number recognized within the NPA, NXX, or SPN.
DID	x...x	Remote DID number recognized within the NPA, NXX, or SPN.
DDD	x...x	Remote DDD number recognized within the NPA, NXX, or SPN.
ITED	x...x	Incoming trunk group exclusion codes for NPA, NXX, or SPN.
ITEI		Incoming trunk group exclusion index.

LD 16 – Configure a Conventional Main for Off-net recognition.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	RDB	Route Data Block.
CUST	0-31	Customer Number.
TKTP	TIE	TIE trunk.
CNVT	(NO), YES	Route to conventional switch (prompted if the response to TKTP is TIE).
DDMI	(0)-255	Digit Manipulation Index (prompted if the response to CNVT is YES).
ATDN	xxxx	Attendant DN of Conventional Main (prompted if the response to CNVT is YES).

Feature operation

No specific operating instructions are required to use this feature; however, the following validation algorithm is used by the system.

Validation Algorithm

Upon reception of a number on a DPNSS1 UDP route configured with INAC = YES, the following validation algorithm applies if SPN is set to YES in the Route Data Block:

- 1 The SPN's NARS Access Code is appended to the received number and a valid NARS code is searched for.
- 2 If no valid NARS code is found, the appended SPN's NARS Access Code is stripped off and a valid SPN or LOC NARS code is searched for.
- 3 If no NARS code is found and if the LOC's NARS Access Code differs from the SPN's NARS Access Code, the LOC's NARS Access Code is appended to the received number and a valid LOC code is searched for.
- 4 If no valid LOC code is found, the appended LOC's NARS Access Code is striped off and the received number is considered invalid, and the call is released.

If SPN was set to NO in the Route Data Block a similar validation algorithm applies, except that the LOC's NARS Access Code is appended first in front of the received number.

Attendant Through Dialling Networkwide

Attendant Through Dialling Networkwide extends the functionality of through dialling via an attendant to any Integrated Services Digital Network (ISDN) or DASS2 outgoing trunk. This feature allows an attendant to seize an outgoing Integrated Services Digital Network (ISDN) or DASS2 trunk for a calling party located on the same or another node.

Refer to “Chapter 2 - ISDN Feature descriptions”, for a description of the Attendant Through Dialling Networkwide feature.

ISDN to DPNSS1/DASS2 gateway

The ISDN to DPNSS1/DASS2 Gateway provides interworking between DPNSS1/DASS2 and the following ISDN interfaces:

- ISDN BRI (line and trunk, Net-3 compliant);
- EuroISDN (ETS 300-102);
- ISDN QSIG (ETS 300-172);
- MCDN (NT proprietary PBX-PBX ISDN protocol).

The following features and capabilities are supported over the ISDN to DPNSS1 gateway:

- Basic call service (3.1 kHz speech, 64K restricted/unrestricted data);
- Overlap sending and receiving;
- 64 kbps bearer capability;
- Data rate adaptation (in accordance with ETS 300-102, and in compliance with BTNR 188 Section 7);
- Mapping of BTNR 189-I supplementary information service strings within DPNSS1 messages.

Operating parameters

The feature has the following limitation:

- PSTN incoming trunks are not to be allowed access to PSTN outgoing trunks

Feature packaging

- DPNSS1 Network Services (DNWK) package 231
- UIGW package 283
- Integrated Digital Access (IDA) package 122
- DPNSS1 package 123
- DASS2 package 124
- PRI2 package 154

— DPNSS189I package 284

Feature implementation

None.

Standalone Meridian Mail

The Standalone Meridian Mail feature provides a Meridian Mail system interface to a third-party vendor's network by way of a DPNSS1 interface to the Meridian Mail system. Users on the third-party exchange can be alerted of the message waiting, and can access the messages that have been left from a remote telephone.

This feature will depend on the features supported via DPNSS1 on your PBX. The Standalone Meridian Mail feature allows access to and from a DPNSS1 interface into and out of Meridian Mail. Prior to Release 20, Meridian Mail could not interface to a remote PBX via DPNSS1, but with this feature it is now possible to send and receive messages from a remote DPNSS1 node. Calls to busy sets, sets with call forwarding activated, or when there is no answer, can be routed to Meridian Mail across a DPNSS1 link to provide voice mail service. All features present on Meridian Mail can then be used as required.

Standalone Meridian Mail introduces the following enhancements:

Automatic Login to Personal Mailbox from User on Third-party PBX

This will enable Meridian Mail users to login from their telephones to the Meridian Mail system offered on the Meridian 1 by simply entering a “#” from the set.

Busy Notification

When Meridian Mail is accessed from the third-party PBX because the user is on another call, Standalone Meridian Mail informs the caller of this by using a voice message.

Call Answer

Call answer enables incoming calls to the third-party PBX which have been diverted to the Standalone Meridian Mail to access the correct mailbox.

Custom System Greeting

This feature is provided to inform callers to the third-party PBX of the organization they have called, if they are calling in on a DID trunk. This announcement precedes the regular voice greeting.

Dual Personal Greeting

For callers terminating on the mail system, this feature provides the option of delivering different messages to internal or external users.

Remote Message Notification

A message waiting lamp can be lit on the remote PBX when a message is left on Meridian Mail for that extension. Currently, this feature is only supported on the Plessey iSDX system.

Operating parameters

Incoming user control to the Standalone mail must be in-band DTMF as post End-of-Dialing digits cannot be supported via DPNSS1 out-of-band signaling. For the Meridian Mail user, in-band DTMF tones are required from the originating party, wherever they originate.

The third-party exchange must be able to allow diversion to a remote switch to allow messages to be left.

Call Sender (a Meridian Mail feature) is not supported with the Standalone Meridian Mail feature.

No gateway functionality between ISDN and DPNSS1 for Meridian Mail access or message waiting capability is implemented with this feature. Access to Meridian Mail for any mailbox user on a network must be via a single signaling system, either Q.931 for a Meridian 1, or DPNSS1 for other PBXs.

No gateway functionality between ISDN and DPNSS1 for DPNSS1 originator diversion is implemented with this feature. Specifically, if a call originates via a DPNSS1 trunk and is redirected via Q.931, no notification of this diversion is made to the originator. The reverse also applies.

The following hardware is required: Meridian Mail module and standard attachments; third-party PBXs with DPNSS1 as needed; Meridian 1 system with DPNSS1 and Meridian Mail hardware, and Q.931 networking trunks.

Operating parameters

None.

Feature interactions

None.

Feature packaging

The new Standalone Meridian Mail (SAMM) package 262 has been introduced for this feature.

Digital Private Network Signaling System 1 (DPNSS1) package 123, and Integrated Digital Access (IDA) package 122 are required for DPNSS1 interworking.

The following packages are required for Meridian Mail: Make Set Busy (MSB) package 17; Integrated Message Services (IMS) package 35; Automatic Call Distribution Package B (ACDB) package 40; Automatic Call Distribution Package A (ACDA) package 45; Message Waiting Center (MWS) package 46; Command Status Link (CSL) package 77; and Auxiliary Processor Link (APL) package 109.

Network Message Services (NMS) package 175 and Advanced ISDN Network Services (NTWK) package 148 are required for remote Meridian Mail operation.

Feature implementation

LD 74 – This overlay is modified to include a DPNSS1 interface specifier.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	DDSL	DPNSS1 signaling link.
...		
MWIF	STD, ISDM	ISDM should be used if the third party PBX is an iSDX switch supporting message waiting with DPNSS1.

LD 15 – The SAMM prompt must be set to YES to enable Standalone Meridian Mail.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	CDB IMS	Customer data block. Release 21 gate opener.
...		
IMS	YES	Integrated Message System.
SAMM	YES, NO	Allow or disallow Standalone Meridian Mail.

LD 10 – Configuration of Standalone Mail Message Servers in this overlay is only necessary when using links to iSDX nodes. The SAMM prompt must be set to YES in LD 15 to enable all call processing functions for Standalone Meridian Mail.

Prompt	Response	Description
REQ	NEW	New.
TYPE	500	Analog PBX set.
...		
CLS	SMSA, SMSD	Allow or disallow Standalone Meridian Mail Server.

Feature operation

This feature enables incoming calls arriving at a third party vendor's PBX to be diverted to Meridian Mail via DPNSS1. The identity of the calling and called parties is given in the Calling Line Category (CLC) of the DPNSS1 message sent by the third party vendor's PBX. The Standalone Meridian Mail feature uses this information to access the correct mailbox on the Meridian Mail system. Telephone set operation is the same for Standalone Meridian Mail as it is for Meridian Mail.

R2 Multifrequency Compelled Signalling to DPNSS1 Gateway

Prior to Release 20, there are a number of countries in Europe, Central America, and South America that require interworking to Other Equipment Manufacturer's PBXs in multivendor networking environments using Digital Private Network Signaling System One (DPNSS1). In these countries, the Central Office protocol is R2 Multifrequency Compelled Signaling (R2MFC) Direct Inward Dialing (DID) and in some cases R2MFC Direct Outward Dialing (DOD). In order for the Meridian 1 to operate in these environments, interworking of DPNSS1 and R2MFC trunks must be provided.

The R2MFC to DPNSS1 Gateway feature provides an interface between R2MFC DID/DOD trunks and DPNSS1 trunks, and can also provide Calling Number Identification (CNI) support for incoming calls.

In addition, the R2MFC to DPNSS1 Gateway feature introduces the following enhancements to the R2MFC incoming CNI request functionalities:

- The ability to request CNI for an incoming R2MFC call is possible immediately after a predetermined number of digits are received. The allowable range for this option is 0 to 7.
- The ability to request CNI for an incoming R2MFC call is possible immediately after an Electronic Switched Network (ESN) code is dialed. The ESN codes recognized for this purpose are Distant Steering Codes (DSC), Trunk Steering Codes (TSC), and NARS/BARS Access Codes (AC1, and AC2).

By using these CNI request options, CNI information will be available before the incoming R2MFC call is routed. This is necessary to provide CNI support for R2MFC DID to DPNSS1 gateway calls, but also provides an alternative for supporting CNI requests for incoming R2MFC calls in general. These options are applicable for incoming R2MFC DID/TIE calls.

Operating parameters

Meridian 1 DPNSS1 networks currently support only Coordinated Dialing Plan (CDP), Special Numbers (SPNs), and Basic Automatic Route Selection (BARS) (for outgoing calls), therefore the R2MFC to DPNSS1 feature does not support Universal Dialing Plans (UDPs).

For R2MFC DID calls routing to DPNSS1 trunks, the option Accept CNI (ACNI) is provided in the DPNSS1 route data block to identify if CNI information should be passed at the gateway. If the ACNI option is set to YES, the far end PBX must accept the Originating Line Identity (OLI) string for Called/Calling Line Category (CLC) Public Switched Telephone Network (PSTN) calls in the Initial Service Request Message (ISRM).

Two additional options are provided for requesting CNI before the R2MFC DID call is even routed as previously described. Using one of these options is the only mechanism that will provide CNI for an R2MFC-DPNSS1 gateway call (unless the call is the result of call redirection). If the interfacing Central Office cannot support such options, both of these options have to be disabled and therefore no CNI will be available for the R2MFC-DPNSS1 gateway call.

CNI is for R2MFC trunks tandeming to DPNSS1 trunks only. For calls originating from DPNSS1 trunks, and tandeming to an outgoing R2MFC trunk, the CNI information in the DPNSS1 call is not used. Existing methods of generating the CNI locally at the gateway node are used.

Interworking of R2MFC TIE trunks and DPNSS1 trunks is not supported for this feature.

Interworking between MFE DID/DOD trunks and DPNSS1 trunks is not supported by this feature. Interworking between MFE KD3 DID/DOD trunks and DPNSS1 trunks is also not supported by this feature.

External Operator Features and Toll Call Identification (from China Number 1 signaling) are not supported by this feature.

No new hardware is required for this feature.

Feature interactions

DPNSS1 Basic Call

The R2MFC Gateway feature introduces a change in the content sent in the Initial Service Request Message (ISRM) when the originator of a DPNSS1 call is an R2MFC DID trunk. If CNI information has been obtained from the incoming trunk, the CNI digits are sent as an OLI string in the IRSM. In that case, the Trunk Identity (TID) string is not sent. If no CNI information is available from the originating trunk, the TID string is sent. The transport of the CNI digits as an OLI is controlled by the Accept CNI (ACNI) option on the outgoing DPNSS1 route.

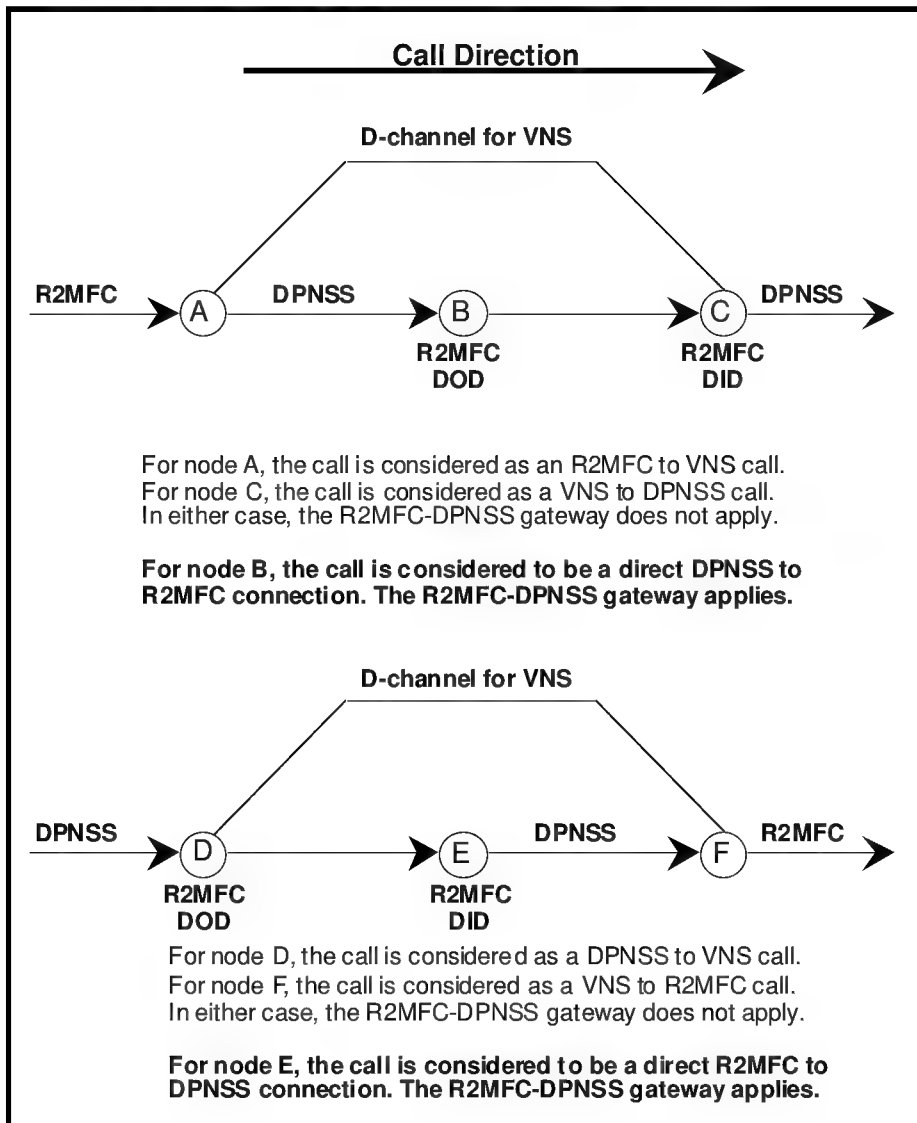
At the terminating node of the DPNSS1 call, an OLI string instead of a TID string may now be received for calls that originate from trunks which are not using ISDN or Integrated Digital Access (IDA) signaling. The information available for call display is now different. If the terminating node cannot handle receiving an OLI from such trunk calls, the ACNI option should be set to NO on the outgoing DPNSS1 route at that gateway.

The Step Back on Congestion (SBOC) option programmed for an outgoing DPNSS1 route is ignored for R2MFC-DPNSS1 gateway calls. Specifically, if an R2MFC DID to DPNSS1 gateway call receives a Clear Request Message (CRM) due to congestion, the call is not rerouted (i.e., does not search for an idle trunk based on the next entry in the Route List Block), regardless of whether or not the SBOC option is programmed. Instead, the call is treated as a congested call and intercept is provided if necessary. If the SBOC option is allowed, there is a potential problem in the gateway signaling because the next outgoing route may not be a DPNSS1 route.

Virtual Network Services (VNS)

If the call on the DPNSS1 (or R2MFC) trunk is tandeming to the R2MFC or (DPNSS1) trunk on a VNS call, the R2MFC to DPNSS1 Gateway feature does not apply. If a DPNSS1/R2MFC tandem is encountered during the routing of a VNS call, the R2MFC to DPNSS1 Gateway feature applies. The following figure illustrates how the R2MFC-DPNSS1 gateway may apply to a VNS call.

Applicability of R2MFC-DPNSS1 Gateway to VNS Calls



CDR Calling Line ID for DPNSS1

At the terminating PBX, the OLI string for the R2MFC DID originated call may contain the CNI information. The Release 20 CDR Enhancement feature automatically prints the contents of the OLI string in the CLID field of the CDR. Hence, the CNI information will be made available on the CDR (i.e., it will be printed in the CLID field).

Feature packaging

No new software option package has been introduced with this feature; however, the following packages are required at the gateway Meridian 1 to provide the basic DPNSS1 and R2MFC signaling functionalities: Integrated Digital Access (IDA) package 122; Digital Private Network Signaling System 1 (DPNSS1) package 123; and Multifrequency Compelled Signaling (MFC) package 128.

For network numbering the following packages are recommended: Coordinated Dialing Plan (CDP) package 59; Basic Automatic Route Selection (BARS) package 57; Pretranslation (PXLT) package 92; Incoming Digit Conversion (IDC) package 113; and Flexible Numbering Plan (FNP) package 160.

The CNI request enhancements are packaged under the existing Multifrequency Compelled Signaling (MFC) package 128.

Feature implementation

LD 16 – Two new prompts (NCNI and CNIE) are introduced in the route data block for defining CNI request options for the R2MFC route.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	RDG	Route data block.
...		
TKTP	DID	Direct Inward Dialing trunk data block.
...		
MFC	YES	
...		
ALRM	...	

Prompt	Response	Description
NCNI	(O)-7	Request CNI after the defined number of digits are received. If NCNI = 0, the CNI request does not depend on the number of digits received. If NCNI is defined to be greater than the number of digits required for routing the call, the CNI will not be requested but the call will be routed.
CNIE	(NO), YES	Request CNI after an ESN code is dialed. This R2MFC route requests/(does not request) CNI after an ESN code is dialed. The ESN code could be a Distant Steering Code (DSC), a Trunk Steering Code (TSC), the NARS Access Code 1 (AC1) or the NARS Access Code 2 (AC2). NCNI and CNIE are prompted when the following occurs: the MFC package is equipped TKTP = DID or TIE MFC = R2MF, and the MFC signaling table is defined on the route. If NCNI > 0 and CNIE = YES, CNI is requested when either one of the conditions is first met.
CNIT	(NO), YES	Request CNI only if the dialed station has Malicious Call Trace Allowed (MCTA) Class of Service.

LD 16 – A new prompt (ACNI) is introduced in the route data block for defining whether the DPNSS1 route supports R2MFC CNI.

Prompt	Response	Description
REQ	NEW, CHG	New, or change.
TYPE	RDB	Route data block.
...		
TKTP	IDA	Integrated Digital Access.
...		
TTBL	...	
ACNI	(NO), YES	Accept Call Number Identification (CNI). This DPNSS1 route allows/(does not allow) R2MFC CNI sent as an Originating Line Identity (OLI) string in the initial service request message (ISRM). This is prompted when the following occurs: the IDA package is equipped the MFC package is equipped TKTP = IDA, and SIGL = DPN/APNS.

Feature operation

Not applicable.

Virtual Network Services in the UK with DASS2/DPNSS1 Bearers

Virtual Network Services (VNS) provides ISDN features to customers when no ISDN Primary Rate Interface (PRI) or ISDN Signalling Link (ISL) Bearer Channels are available between two Meridian 1 switches (please refer to the VNS feature description module in this NTP for detailed information on VNS.)

The Virtual Network Services with DASS2/DPNSS1 Bearers feature introduces VNS in the UK using Digital Private Network Signalling System No.1 (DPNSS1) or Digital Access Signalling System No.2 (DASS2) trunks as VNS Bearer trunks.

Operating parameters

All of the operating parameters that pertain to the Basic VNS feature also apply to the Virtual Network Services with DASS2/DPNSS1 Bearers feature (please refer to the VNS feature description module in this NTP.) The following parameters also apply.

Analog Private Networking Signalling System (APNSS) trunks cannot function as VNS Bearer trunks.

No DPNSS1 Supplementary Service is provided when DPNSS1 trunks are used as a VNS Bearer trunk. ISDN features are provided instead. If any of the DPNSS1 Supplementary Service features requires a DPNSS1 route, it cannot use a VNS route.

If ESN is configured, a route list entry with both VNS and DPNSS1 is not chosen.

For DPNSS1/VNS gateway nodes in mixed DASS2/DPNSS1 and VNS networks, the gateway nodes are subject to the same feature support and limitations as the standard DPNSS1/ISDN gateway without VNS. If there is no DPNSS1/ISDN gateway, the feature will be stopped at the DPNSS1/VNS node.

Feature interactions

Analog Private Networking Signalling System (APNSS)

APNSS trunks cannot function as VNS Bearer trunks.

Data calls

Data calls are supported on DPNSS1 or DASS2 VNS Bearer trunks if the DPNSS1 or DASS2 VNS Bearer trunks are configured to support data calls. Similarly, data calls are supported on DPNSS1 or DASS2 Bearer trunks in VNS to DPNSS1/DASS2 gateways, if the DPNSS1 or DASS2 VNS Bearer trunks are configured to support data calls.

DPNSS1 Attendant Call Offer

DPNSS1 Attendant Call Offer is not supported over VNS Bearer trunks (DPNSS1 Attendant Call Offer allows an attendant-extended call, routed over a DPNSS1 trunk, to be camped-on to a remote busy extension.) Standard ISDN Camp-on may be provided instead, if NAS is configured over the VNS Bearer trunks.

DPNSS1 Attendant Timed Reminder Recall and Attendant Three-Party Service

DPNSS1 Attendant Timed Reminder Recall and Attendant Three-Party Service are not supported over VNS Bearer trunks. If NAS is configured over the VNS Bearer trunks, NAS call extension and Attendant Recall will be offered instead.

DPNSS1 Call Back When Free and Call Back When Next Used

DPNSS1 Call Back When Free and Call Back When Next Used are not supported over VNS Bearer trunks. Network Ring Again or Network Ring Again on No Answer may be provided instead, if Network Ring Again or Network Ring Again on No Answer are configured over the VNS Bearer trunks.

DPNSS1 Diversion

DPNSS1 Diversion is not supported over VNS Bearer trunks. Network Call Redirection and Trunk Route Optimization can be provided instead, if configured over the VNS D-Channel.

DPNSS1 Extension Three-Party Service

DPNSS1 Extension Three-Party Service is not supported over VNS Bearer trunks. Network Call Redirection and Trunk Route Optimization can be provided instead, if configured over the VNS D-Channels.

DPNSS1 Loop Avoidance

DPNSS1 Loop Avoidance is not supported over VNS Bearer trunks (DPNSS1 Loop Avoidance prevents a call from being looped through a DPNSS1 network by placing a limit on the number of channels that a call can use.) The ISDN Call Connection Limitation is provided, if it is configured over the VNS D-Channel.

DPNSS1 Route Optimization

DPNSS1 Route Optimization is not supported over VNS Bearer trunks.

DPNSS1 Route Optimization/ISDN Trunk Anti-Tromboning Interworking

ISDN Trunk Anti-Tromboning may be applied to the VNS part of the call, if configured on the VNS D-Channel.

DPNSS1 Step Back On Congestion

DPNSS1 Step Back On Congestion handles high traffic situations when congestion is encountered by DPNSS1 trunks. The following scenarios apply for interworking with VNS.

Homogeneous Networks

DPNSS1 Step Back On Congestion is supported over VNS Bearer trunks, if all the transit nodes within the DPNSS1 network used for VNS are configured accordingly:

- In LD 86, if the SBOC (Step Back On Congestion) prompt is set to NRR (No Reroute) or RRO (Reroute Originator), then it would be sufficient that the VNS originating node be configured with either RRO (Reroute Originator) or RRA (Reroute All).
- In LD 86, if the SBOC (Step Back On Congestion) prompt is set to RRA (Reroute All) for a transit node, then the different alternative routes at this node must be configured with VNS and must be configured as VNS Bearers.

Hybrid NetworksMCDN/VNS with DPNSS1 node

- If a congestion is encountered inside the VNS portion of the path, the node behaves as an MCDN/MCDN tandem. The ISDN Drop Back Busy (IDBB) and ISDN Off-Hook Queuing (IOHQ) are transmitted, so that they may be applied further along the VNS portion of the path, or at the tandem node.
- If a congestion is encountered within the DPNSS1 network, the VNS portion of the call is cleared and the disconnection is propagated back to the originating side of the MCDN path. Neither Drop Back Busy nor Off-Hook Queuing is activated at the tandem node, even if IDBB or IOHQ are activated.

VNS with DPNSS1/DPNSS1 node

This scenario is considered as an MCDN/DPNSS1 gateway. The functionality is the same as for the Step Back on Congestion feature, as documented in DPNSS1 Product Information Guide 553-3921-100.

DPNSS1/VNS with DPNSS1 node



- If a congestion is encountered inside the VNS portion of the path, the VNS portion of the call is cleared and the disconnection is propagated back to the originating DPNSS1 side. The Step Back on Congestion feature is invoked, if it is configured.
- If a congestion is encountered the within the DPNSS1 portion of the path, with the DPNSS1 trunk being used as a VNS Bearer, the VNS portion of the call is cleared and a normal disconnection is propagated back to the originating DPNSS1 side. The Step Back on Congestion feature is not invoked, even if it is configured.

DPNSS1 Executive Intrusion

DPNSS1 Extension Three-Party Service is not supported over VNS Bearer trunks. Attendant Break-in may be provided instead, if NAS is configured over the VNS Bearer trunks.

Standalone Meridian Mail

Standalone Meridian Mail is not supported over VNS Bearer trunks. A mailbox user may access Meridian Mail, if the ISDN Network Message Services is configured.

DPNSS1 Enhancements for ISDN Interworking

The Generic X11 Release 20B software introduced enhancements to allow DPNSS1 to interwork with QSIG and EuroISDN. At an ISDN gateway, ISDN information may carried into some DPNSS1 messages, if DPNSS_189I package 284 is equipped.

DPNSS1/DASS2 to ISDN PRI Gateway

A VNS call over a DPNSS1 or DASS2 Bearer trunk of an DPNSS1/DASS2 to ISDN PRI Gateway acts as the ISDN leg of the Gateway.

Feature packaging

For total feature functionality, the following packages are required:

- Virtual Network Services (VNS) package 183;
- Network Alternative Route Selection (NARS) package 58;
- Network Class of Service (NCOS) package 32;
- Basic Routing (BRTE) package 14;
- Integrated Services Digital Networking (ISDN) package 145;
- ISDN Signaling Link (ISL) package 147;
- Advanced Network Services (NTWK) package 148;
- Integrated Digital Access (IDA) package 122;
- 2 MBit Primary Rate Interface (PRI2) package 154;
- Digital Private Network Signaling System No.1 (DPNSS) package 123, for routes using DPNSS1 signaling; and
- Digital Access Signaling System No.2 (DASS2) package 124, for routes using DASS2 signaling.

For ISDN to DPNSS1/DASS2 gateway:

- International Supplementary Features (SUPP) package 131; and
- Network Attendant Service (NAS) package 159.

For the Step Back on Congestion Supplementary Service feature:

- DPNSS1 Network Services (DNWK) package 231.

The following packages may also be used:

- Universal ISDN Gateway (UIGW) package 283; and
- ISDN SIS (BTNR-I on DPNSS1), (DPNSS1_189I) package 284.

Feature administration

LD 17- Configure the VNS D-Channel to be associated with the VNS route.

The D-Channel should be associated with each node and customer, that is, both ends of the D-Channel link should be configured.

Prompt	Response	Description
REQ	CHG, END	Change data, or exit the Overlay.
TYPE	ADAN	Action Device and Number.
ADAN	CHG DCH 0-15	Change the D-Channel.
USR	VNS SHAV	VNS=Dedicated D-Channel SHAV=Shared D-Channel.
VNSM	0-300	The maximum number of VNS channels supported by the D-Channel. Note: This is the potential VNS capability for the D-Channel, and is not associated with any other restriction placed on the VNS capability, such as the number of VNS Virtual DNs.
VNSC	xx	At least one D-Channel must be configured with USR=VNS or USR=SHAV.
VNSP	0-32700	Private Network Identifier (PNI) of the far-end customer.
VCNA	(NO) YES	Network Call Party Name Display is (not) available over the D-Channel.
VCRD	(NO) YES	Network Call Redirection is (not) available over the D-Channel.
VTRO	(NO) YES	Trunk Route Optimization Before Answer is (not) available over the D-Channel.

LD 96 - Enable the D-Channel that has been configured in LD 17.

Prompt	Response	Description
...	ENL DCH 0-15	Enable the D-Channel.

LD 79 - Define the VNS DNs for both nodes/customers to be associated with the D-Channel configured in LD 17. You may add a new individual VDN to an existing VNS VDN block, or create a new VNS VDN block.

Prompt	Response	Description
REQ	NEW	Add an individual VDN to an Create a new VNS data block.
TYPE	VNS	Virtual Network Services.
CUST	xx	Customer number. At least one D-Channel must be configured with USR=VNS or USR=SHAV and having VNS=Customer number.
VNDN	xxxxxxx 1-4000 xxxxxxx <CR>	Individual VDN to be added. 1-4000=number of contiguous VDN to be added, xxxxxxx=first VDN to be added. You may add another single VDN by entering <CR> (VDN is prompted until <CR> is entered.) Note: For the above entries, the VDNs must be pat of the customer's numbering plan.

LD 16 – Set up the VNS Bearer Trunk.

The Bearer trunk should be associated with each node and customer, that is, both ends of the Bearer link should be configured.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change data.
CUST	xx	Customer number. At least one D-Channel must be configured with USR=VNS or USR=SHAV, in LD 17.
ROUT	0-511	The number of the route to be associated with the VNS Bearer Channel.
CNTL	YES	Change controls or timers.
TIMR	VSS (0) 1 2-1023	0=Do not answer the Bearer channel until the terminating party answers. 1=Answer the Bearer channel immediately on arrival. 2-1023=Answer the Bearer Channel after specified seconds (rounded down to multiple of two seconds) if the terminating party has not already answered.
TIMR	VDG 0-(6)-31	Enter the guard timer on the associated VNS DN (the time allowed for the Bearer trunk call to disconnect, in seconds)
VRAT	(NO) YES	(Do not) immediately answer the attendant extended VNS call on the incoming Bearer trunk.

LD 86 – Configure the VNS trunk route.

Prompt	Response	Description
REQ	NEW, CHG	Add, or change.
CUST	xx	Customer number.
FEAT	RLB	Route list data block feature.
RLI	0-MXRL	The Route List Index to be associated with the VNS Bearer Channel.
ENTR	0-63	The entry within the Route List Index to be associated with the VNS Bearer Channel.
ROUT	0-511	The number of the Route to be associated with the VNS Bearer Channel.
VNS	YES	Virtual Network Services.
- VDCH	0-15	The D-Channel used for VNS call. At least one D-Channel must be configured with USR=VNS or USR=SHAV, in LD 17.
- VDMI	(0) 1-31 1-255 0-999	VNS Digit Manipulation Table to be used on the VNS D-Channel. None With CDP. With NARS/BARS. With Flexible Numbering Plan.
-VTRK	1-(20)-100	Number of VNS trunks allowed on the VNS route.
...		
DMI	(0) 1-31 1-255 0-999	VNS Digit Manipulation Table to be used on the VNS Bearer. None. With CDP. With NARS/BARS. With Flexible Numbering Plan.

Feature operation

There are no operating procedures specified for this feature.

DASS2 feature descriptions

Call Charge Information

Call cost information is sent to the originating PBX at the end of a call.

Calling/Called Line Identity

Identity of the calling and called parties being sent over DASS2 trunks within limitations of any connected or interconnecting circuits.

Category 1 Call

A voice or data call that must be on a 64 Kbit digital channel. This call may use the swap feature and may not be intruded upon.

Category 2 and Telephony Calls

With a category 2 call it is desirable to use a digital channel but not essential and swap may be used if digital. A digital channel is not essential for a telephony call, swap may not be used and some supplementary features may be barred.

Closed User Group

A group that are only allowed to communicate with each other but allowing for some members to make or receive calls from outside the group.

Maintenance Procedure

This provides just a status information interchange.

Network Address Extension

DASS2 allows additional routing information of up to 6 digits to pass through transparently when required by connected PBX systems.

User to User Signalling and Tie Line Signalling

Customers can send signals over the link during a call to provide services. One or more channels of a DASS2 link may be allocated as a permanent circuit to another PBX to provide a tie line.

Feature operation

The use of NT hardware does not change the operation of the existing DPNSS1/DASS2 feature.

Data Calls

A Service Indicator Code with the following characteristics is sent if a call is originated from a data set:

Type of Data:	Data:
Data Rate	64 kbit/sec
Data Type, Asynchronous	1 stop bit
Data Mode	Full Duplex
Details of Data	Asynchronous
Data Format	8 data bits
Flow Control	TA does not have capability

DPNSS1/DASS2 Limitations

The DPNSS1/DASS2 Protocols have the following limitations:

- BARS/NARS is not supported for incoming DPNSS1 calls
- DASS2 Swap Supplementary Service is not supported
- The Meridian 1 supports most Supplementary Services as a transit node. However, Step Back On Congestion, Priority Breakdown and Loop Avoidance are not supported. In these cases the Meridian 1 appears transparent, passing the Supplementary Service Request through to the next DPNSS1 node.

DPNSS1/DASS2 Package Requirements

The following options comprise the DASS2/DPNSS1 Protocols software set:

Feature	Option
ISDN	145
PRI2	154
IDA	122
DNWK	231
DPNSS1	123
DASS2	124

DASS2/DPNSS1 Packaging Notes

- A Meridian 1 with routes using Level 3 DPNSS1 signaling requires the IDA and DPNSS1 packages.
- A Meridian 1 with routes using Level 3 DASS2 signaling requires the IDA and DASS2 packages.
- In a network which uses DPNSS1 and DASS2, the DASS2 package is required only at those Meridian 1s which are serving as DASS2 gateways.
- A semi-permanent connection across the ISDN requires the DPNSS1 package rather than the DASS2 package.
- Interworking of Network Ring Again across DPNSS1 and Q.931 requires the NRAG package.

